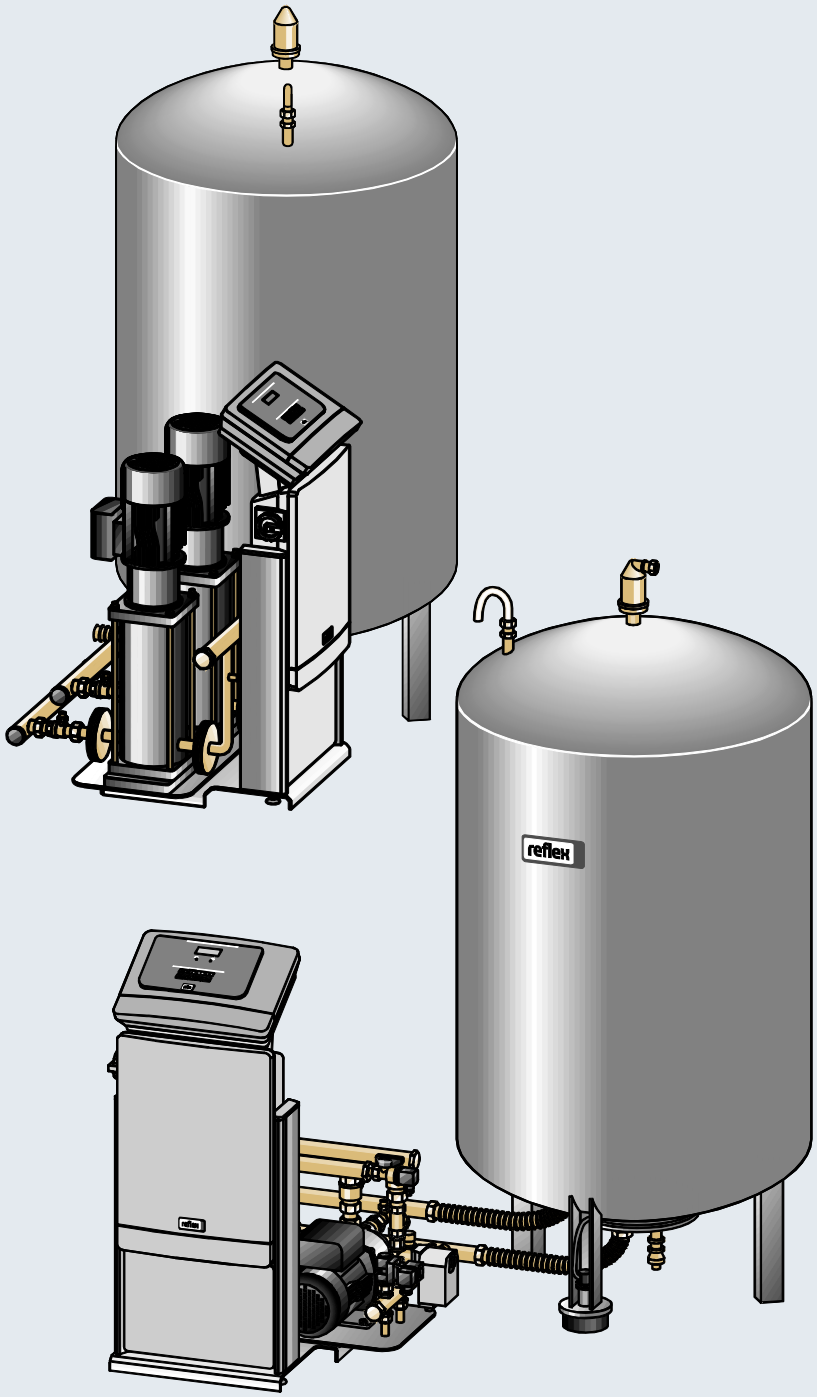
reflex
Thinking solutions.

Variomat with Touch controller

with one pump:
VS 2-1/60 /75 /95
with two pumps:
VS 2-2/35 /60 /75 /95

GB Operating manual

Original operating manual



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1 Notes on the operating manual

This operating manual is an important aid for the safe and reliable function of the device.

The operating manual is intended to:

- Avert dangers to personnel.
- Understand the device.
- Obtain optimal functioning.
- Early identify and rectify problems.
- Avoid faults caused by improper use.
- Prevent repair costs and downtimes.
- Increase reliability and service life.
- Prevent damage to the environment.

Reflex Winkelmann GmbH cannot accept any liability for damage caused by ignoring this operating manual. In addition to this operating manual, you must comply with national legislation and regulations in the country of use (accident prevention, environment protection, save and proper work, etc.).

This operating manual describes the device with basic equipment and interfaces for optional equipment with additional functions. For optional equipment and accessories, see chapter 4.6 "Optional equipment and accessories" on page 13 .

Notice!

Every person installing this equipment or performing any other work at the equipment is required to carefully read this operating manual prior to commencing work and to comply with its instructions. The manual is to be provided to the device operator and must be stored near the device for access at any time.

2 Liability and guarantee

The product is manufactured to the latest engineering standards and acknowledged safety regulations. Nevertheless, risk of injury and death for the user and other parties and damage to the system and other property can arise from its use.

Modifications of the device such as changes of the hydraulic system or interference with the interconnection are strictly prohibited.

The liability and guarantee of the manufacturer are excluded when the malfunction can be traced back to one or more of the following causes:

- Improper use of the device.
- Improper commissioning, operation, maintenance, servicing, repair, and installation of the device.
- Ignoring the safety notes in this operating manual.
- Device operation with defective or improperly installed safety and/or protective equipment.
- Failure to perform maintenance and inspection work at due times.
- Use of unauthorised replacement parts and accessories.

The precondition for any guarantee claims is the proper installation and commissioning of the device.

Notice!

Have the Reflex Customer Service carry out commissioning and the annual maintenance, see chapter 12.1 "Reflex Customer Service" on page 71 .

3 Safety

3.1 Explanation of symbols

3.1.1 Symbols and notes used

The following symbols are used in this operating manual.

Danger

- Danger to life and/or severe damage to health
  - The corresponding warning symbol in combination with the "Danger" signal term indicates an imminent threatening danger which will result in death or severe (irreversible) injuries.

Warning

- Severe damage to health
  - The corresponding warning symbol in combination with the "Warning" signal term indicates a threatening danger which may result in death or severe (irreversible) injuries.

Caution

- Damage to health
  - The corresponding warning symbol in combination with the "Caution" signal term indicates a danger which may result in minor (reversible) injuries.

Attention!

- Damage to property
  - This symbol in combination with the "Attention" signal word indicates a situation that may cause damage to the product itself or objects in its vicinity.

Notice!

This symbol in combination with the "Notice" signal word indicates useful tips and recommendations regarding the efficient use of the product.

3.1.2 Safety symbols used

The following safety symbols are used in this operating manual. They are also attached to the equipment or in its vicinity.

This symbol warns of electric.voltage.

This symbol warns of a hot surface.

This symbol warns of overpressure in conduits and connections.

3.2 Personnel requirements

Only specialist personnel or specifically trained personnel may install and operate the equipment.

The electric connections and the wiring of the device must be executed by a specialist in accordance with all applicable national and local regulations.

3.3 Personal protective equipment

When working at the system, wear the stipulated personal equipment such as hearing and eye protection, safety boots, helmet, protective clothing, protective gloves.

See the national regulation of your country for personal protective equipment required.

3.4 Intended use

- The devices are manufactured from steel with exterior coating; the interior is uncoated. The devices may be used only in systems that are sealed against corrosion and with the following water types:
  - Non-corrosive
  - Chemically non-aggressive
  - Non-toxic
- The ingress of atmospheric oxygen by permeation into the entire heating and cooling water system, make-up water and similar must be reliably minimised during operation.

3.5 Inadmissible operating conditions

The devices are not suited for the following conditions.

- In mobile system operation
- For outdoors operation
- For the use with mineral oils
- For the use with flammable media
- For the use with distilled water

Notice!

Changes to the hydraulic system or interference with the interconnection are strictly prohibited.

3.6 Residual risks

This device has been manufactured to the current state of the art. However, some residual risk cannot be excluded.

Caution – risk of burning!

- Excessive surface temperatures in heating systems can cause skin to burn.
  - Wait until surfaces have cooled down or wear protective gloves.
  - The operator is required to attach corresponding warning notes in the device vicinity.

Caution – risk of injury!

- Incorrect installation or service work may cause burns and other injuries at the connections when hot water or steam suddenly escape at pressure.
  - Ensure proper installation.
  - Ensure that the system is de-pressurised before performing service work at the connections.

Warning – large weight!

- The devices are very heavy. Thus, there is a risk of physical damage and accidents.
  - Use only lifting gear suitable for transport and installation.

4 Description of the device

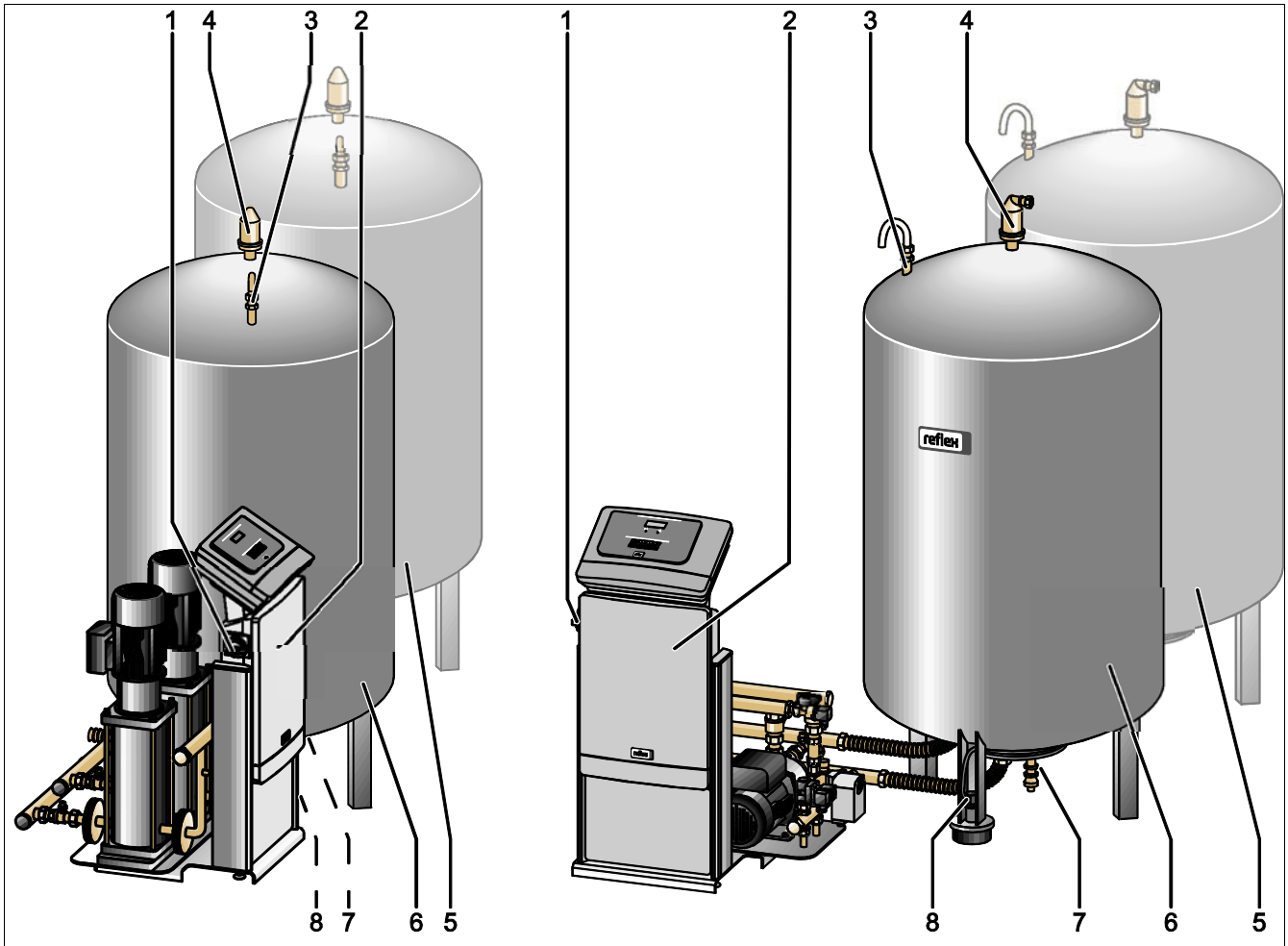
4.1 Description

The Variomat is a pump-controlled pressure maintaining, make-up and degassing station for heating and cooling water systems. The Variomat is essentially a controller with pump and at least one expansion tank. A diaphragm in the extension tank separates the same into an air and a water space, preventing the penetration of atmospheric oxygen into the expansion water.

The Variomat provides the following safety features:

- Optimisation of all pressure maintaining, degassing and make-up processes.
  - No direct intake of air thanks to a regulation of the pressure maintenance with automatic make-up.
  - No circulation issues caused by free bubbles in the circuit water.
  - Reduced corrosion damage due to oxygen removal from fill and make-up water.

4.2 Overview



Variomat with touch control and two pumps

Variomat with touch control and one pump

1	Main switch
2	Control unit • Pump(s) • "Reflex Control Touch" controller
3	"VE" equalisation elbow
4	"DV" degassing valve

5	"VF" secondary tank
6	"VG" primary tank
7	"FD" feed and drain cock
8	"LIS" level sensor

4.3 Identification

4.3.1 Nameplate

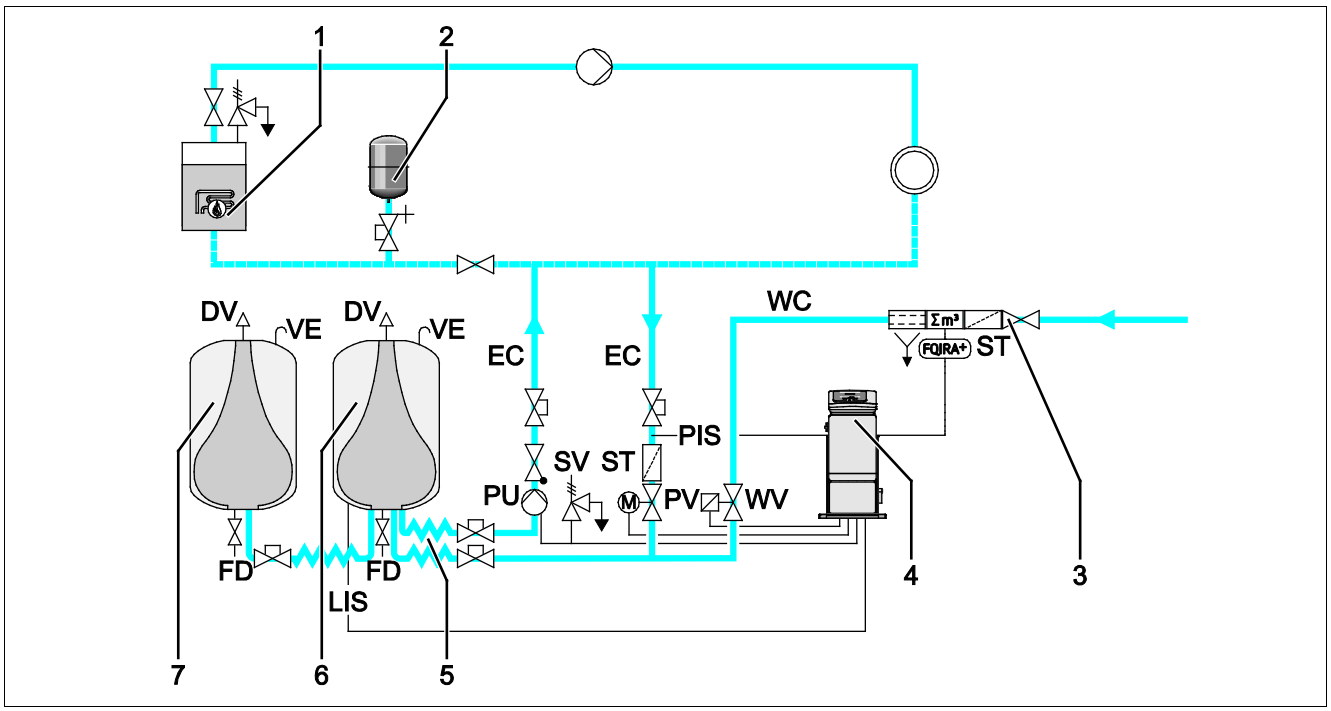
The nameplate provides manufacturer information, year of manufacture, serial number, and technical data.

Information on nameplate	Meaning
Type	Device name
Serial No.	Serial number
min. / max. allowable pressure P	Minimum/maximum permissible pressure
max. continuous operating temperature	Maximum temperature for continuous operation
min. / max. allowable temperature / flow temperature TS	Minimum/maximum permissible temperature/TS flow temperature
Year built	Year of manufacture
min. operating pressure set up on shop floor	Factory-set minimum operating pressure
at site	Set minimum operating pressure
max. pressure saftey valve factory - aline	Factory-set opening pressure of the safety valve
at site	Set opening pressure of the safety valve

4.3.2 Type code

No.		Type code
1	Control unit designation	Variomat VS 2-1/60, VG 500 l, VF 500 l 1 2 3 4 5 6
2	Number of pumps	
3	Pump type	
4	Primary tank	
5	Nominal volume	
6	Secondary tank	

4.4 Function



1	Heating system
2	"MAG" pressure expansion tank
3	Reflex Fillset Impulse, see chapter 4.6 "Optional equipment and accessories" on page 13 .
4	Control unit
5	Hydraulic inlets • For gas-rich water • For degassed water
6	Primary tank air space
7	Secondary tank air space
ST	Dirt trap
FQIRA+	Contact water meter
WC	Make-up line

WV	Make-up valve
PIS	Pressure sensor
PV	Overflow valve (motor ball valve)
PU	Pump (pressure maintenance)
SV	Safety valve
EC	Expansion line • For gas-rich water • For degassed water
FD	Feed and drain cock
LIS	Pressure pick-up
DV	Degassing valve
VE	Aeration and de-aeration

The device is a pressure maintaining station for heating and cooling water systems. It is used for maintaining pressure, making-up and degassing the water in heating and cooling systems. It comprises a control unit consisting of a controller with hydraulics and at least one expansion tank.

Expansion tank

One primary tank and multiple optional secondary tanks may be connected. A diaphragm separates the tanks into an air and a water space, preventing the penetration of atmospheric oxygen into the expansion water. The "VE" line connects the air space with the atmosphere. The primary tank is hydraulically flexibly connected to the control unit. The function of the "LIS" level measuring using a pressure pick-up is thus ensured.

Control unit

The control unit contains the hydraulic system and the controller. The "PIS" pressure transducer records the pressure and the "LIS" pressure pick-up registers the level; both values are displayed at the controller.

Maintaining pressure

The pressure in the system rises when the water is heated. When the pressure set at the controller is exceeded, the "PV" overflow valve opens and drains water from the system into the primary tank, using the "EC" expansion line. The pressure within the system drops. The pressure in the system drops when the water cools. When the pressure drops below the set value, the "PU" pump is activated and uses the "EC" expansion line to transport water from the primary tank back into the system. The pressure in the system rises. The controller ensures that the pressure is maintained, further supported by the stabilisation provided by the "MAG" expansion tank.

Degassing

Two "EC" expansion lines are required to degas the system water. One line is intended for gas-rich water from the system, and the other one serves to return the degassed water to the system. During the degassing action, the "PU" pump and the "PV" overflow valve are in operation. This transports a gas-rich partial flow of the system water V through the de-pressurised primary tank. Atmospheric pressure is used to separate the free and dissolved gases and to discharge them through the "DV" degassing valve. The controller ensures the hydraulic equalisation by regulating the stroke of the "PV" overflow valve (motor ball valve). There are three different modes for this process: continuous, interval or run-on degassing.

Make-up

When the water level in the primary tank falls below the minimum, the "WV" make-up valve opens until the set level is again reached. During the make-up process, the number of requests, the time and the make-up duration within a cycle are monitored. Using a FQIRA+ contact water meter, the system monitors each individual make-up volume and the overall make-up volume.

4.5 Scope of delivery

The scope of delivery is described in the shipping document and the content is shown on the packaging. Immediately after receipt of the goods, please check the shipment for completeness and damage. Please notify us immediately of any transport damage.

Basic pressure-maintaining equipment:

- The device on a pallet.
  - Control unit and "VG" primary tank.
  - Connection kit in cardboard box and add-on components in a plastic bag for the "VG" primary tank.
  - Plastic sleeve with operating manual.

Optional equipment and accessories:

- Thermal insulation for the "VG" primary tank.
- "VF" secondary tanks with add-on components in a plastic bag and a set of flexible hoses.

4.6 Optional equipment and accessories

The following optional equipment and accessories are available for this device:

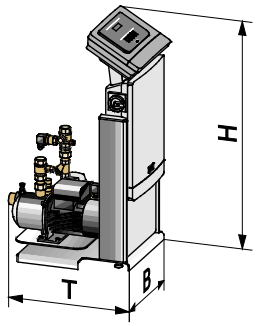
- Fillset for make-up with water.
  - Fillset with integrated back flow preventer, water meter, dirt trap, and locking mechanisms for the "WC" make-up line.
- Fillset Impulse with FQIRA+ contact water meter for make-up with water.
- Servitec for make-up and degassing.
- Fillsoft for softening the make-up water from the public water network.
  - Fillsoft is installed between Fillset and the device. The device controller evaluates the make-up quantities and signals a required replacement of the softening cartridges.
- Enhancements for the device controller:
  - I/O module for standard communication.
  - Master-Slave-Connect for master controllers for maximum 10 devices.
  - Bus modules:
    - Lonworks Digital
    - Lonworks
    - Profibus DP
    - Ethernet
- Diaphragm rupture monitor.

Notice!

Separate operating instructions are supplied with accessories.

5 Technical data

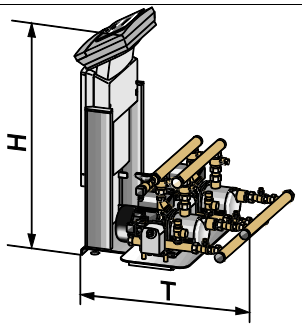
Control unit with one pump



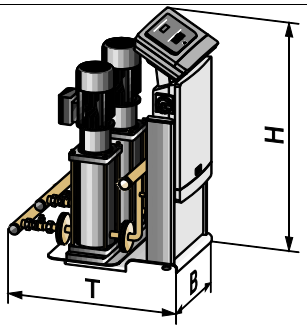
Control unit: VS 2-1 / 60
Control unit: VS 2-1 / 75
Control unit: VS 2-1 / 95

Type	VS 2-1/60	VS 2-1/75	VS 2-1/95
Part No.	8910200	8910300	8910400
Noise level	55 dB	55 dB	55 dB
Electric output	1.1 kW	1.1 kW	1.1 kW
Electric supply	230 V	230 V	230 V
Frequency	50 Hz	50 Hz	50 Hz
Degree of protection	IP 54	IP 54	IP 54
Voltage	230 V	230 V	230 V
Control unit height	920 mm	920 mm	920 mm
Control unit width	470 mm	530 mm	530 mm
Control unit depth	730 mm	640 mm	640 mm
Weight	33 kg	35 kg	37 kg
Primary tank connection	2 × G1	2 × G1	2 × G1
Permissible gauge working pressure	According to nameplate	According to nameplate	According to nameplate
Test pressure pr EN 13831	1.43*pmax	1.43*pmax	1.43*pmax
Permissible flow temperature	120 °C	120 °C	120 °C
Permissible operating temperature	70 °C	70 °C	70 °C
Permissible ambient temperature	0 °C – 45 °C	0 °C – 45 °C	0 °C – 45 °C

Control unit with two pumps



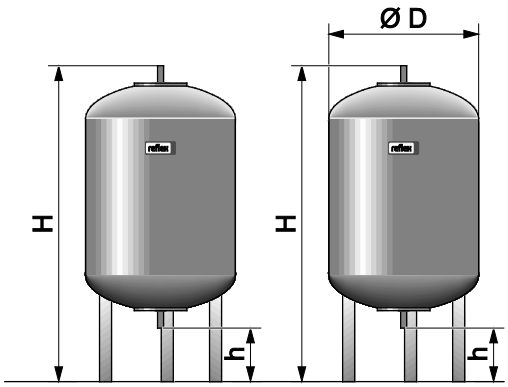
Control unit: VS 2-2 / 35
Control unit: VS 2-2 / 60



Control unit: VS 2-2 / 75
Control unit: VS 2-2 / 95

Type	VS 2-2/35	VS 2-2/60	VS 2-2/75	VS 2-2/95
Part No.	8911100	8911200	8911300	8911400
Noise level	55 dB	55 dB	55 dB	55 dB
Electric output	1.2 kW	2.2 kW	2.2 kW	2.2 kW
Electric supply	230 V	230 V	230 V	230 V
Frequency	50 Hz	50 Hz	50 Hz	50 Hz
Degree of protection	IP 54	IP 54	IP 54	IP 54
Voltage	230 V	230 V	230 V	230 V
Control unit height	920 mm	920 mm	920 mm	920 mm
Control unit width	700 mm	700 mm	720 mm	720 mm
Control unit depth	780 mm	780 mm	800 mm	800 mm
Weight	54 kg	58 kg	72 kg	76 kg
Primary tank connection	2 × G 1 ¼	2 × G 1 ¼	2 × G 1 ¼	2 × G 1 ¼
Permissible gauge working pressure	According to nameplate	According to nameplate	According to nameplate	According to nameplate
Test pressure pr EN 13831	1.43*pmax	1.43*pmax	1.43*pmax	1.43*pmax
Permissible flow temperature	120 °C	120 °C	120 °C	120 °C
Permissible operating temperature	70 °C	70 °C	70 °C	70 °C
Permissible ambient temperature	0 °C – 45 °C	0 °C – 45 °C	0 °C – 45 °C	0 °C – 45 °C

Tanks



Primary tank Secondary tank

Type	200	300	400	500	600	800	1000
Primary tank, Article No.	8600011	8600111	8600211	8600311	8600411	8600511	8600611
Secondary tank, Article No.	8610000	8610100	8610200	8610300	8610400	8610500	8610600
"VW" thermal insulation for heating systems, Article No.	7985700	7986000	7995600	7983900	7995700	7993800	7993900
Diameter Ø "D"	634 mm	634 mm	740 mm	740 mm	740 mm	740 mm	740 mm
Height "H"	1060 mm	1360 mm	1345 mm	1560 mm	1810 mm	2275 mm	2685 mm
Height "h"	146 mm	146 mm	133 mm	133 mm	133 mm	133 mm	133 mm
Weight	37 kg	54 kg	65 kg	78 kg	94 kg	149 kg	156 kg
Connection in inches	G1	G1	G1	G1	G1	G1	G1

Type	1000	1500	2000	3000	4000	5000
Primary tank, Article No.	8600705	8600905	8601005	8601205	8601305	8601405
Secondary tank, Article No.	8610705	8610905	8611005	8611205	8611305	8611405
"VW" thermal insulation for heating systems, Article No.	7986800	7987000	7987100	7993200	7993300	7993400
Diameter Ø "D"	1000 mm	1200 mm	1200 mm	1500 mm	1500 mm	1500 mm
Height "H"	2130 mm	2130 mm	2590 mm	2590 mm	3160 mm	3695 mm
Height "h"	350 mm	350 mm	350 mm	380 mm	380 mm	380 mm
Weight	320 kg	465 kg	565 kg	795 kg	1080 kg	1115 kg
Connection in inches	G1	G1	G1	G1	G1	G1

6 Installation

Danger – Electric shock!

- Serious injury or death due to electric shock.
  - Any system in which the device is to be installed must be de-energised.
  - Ensure that the system is locked and cannot be switched on by other personnel.
  - Installation work for the electric connection of the device must be carried out by an authorised electrician in compliance with electrical engineering regulations.

Caution – risk of injury!

- Incorrect installation or service work may cause burns and other injuries at the connections when hot water or steam suddenly escape at pressure.
  - Ensure proper installation.
  - Ensure that the system is de-pressurised before performing service work at the connections.

Caution – risk of burning!

- Excessive surface temperatures in heating systems can cause skin to burn.
  - Wait until surfaces have cooled down or wear protective gloves.
  - The operator is required to attach corresponding warning notes in the device vicinity.

Caution – Risk of injury due to falls or bumps!

- Bruising from falls or bumps at system components during installation.
  - Wear personal protective equipment (helmet, protective clothing, gloves, safety boots).

Notice!

The proper installation and commissioning must be confirmed in the installation, commissioning and maintenance certificate. This certificate is prerequisite for any warranty claim.

– Have the Reflex Customer Service carry out commissioning and the annual maintenance.

6.1 Installation conditions

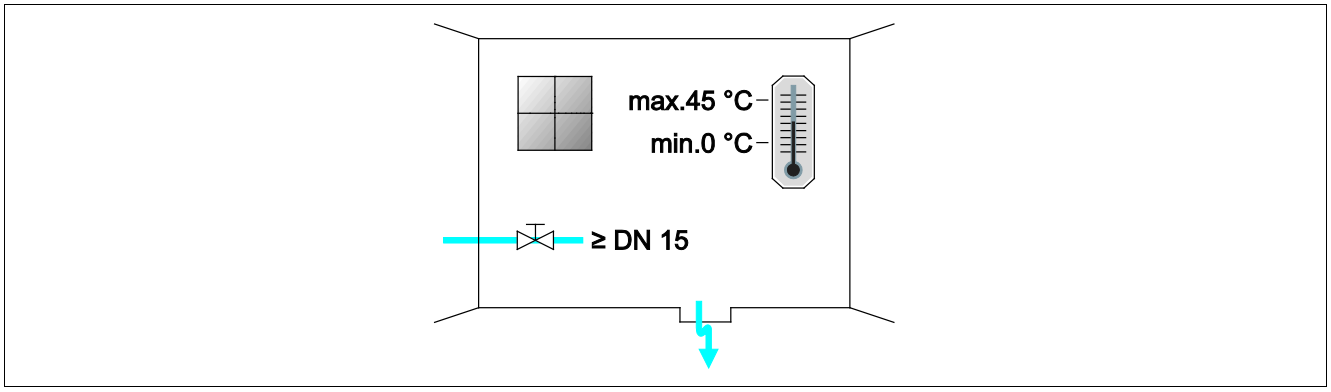
6.1.1 Incoming inspection

Prior to shipping, this device was carefully inspected and packed. Damages during transport cannot be excluded.

Notice!

After receipt of the goods, please check the shipment for completeness and damage. Document any transport damage. Contact the shipper to register a claim for damage.

6.2 Preparatory work



Conditions for the device installation:

- No access by unauthorised personnel.
- Frost-free, well ventilated room.
  - Room temperature 0 °C to 45 °C.
- Level, stable flooring.
  - Ensure sufficient bearing strength of the flooring before filling the tanks.
  - Ensure that the control unit and the tanks are installed on the same level.
- Filling and dewatering option.
  - Provide a DN 15 filling connection according to DIN 1988 T 4.
  - Provide an optional cold water inlet.
  - Prepare a drain for the drain water.
- Electric connection: 230 V~, 50 Hz, 16 A with upstream ELCB: Tripping current 0.03 A.
- Use only approved transport and lifting gear.
  - The load fastening points at the tanks must be used only as installation resources.

6.3 Execution

Attention! – Damage caused by improper installation

- Remember that the connection of pipelines or equipment originating with the system may cause additional stresses to the device.
  - Ensure a stress-free installation of the pipe connections between the device and the overall system.

For installation, proceed as follows:

- Position the device.
- Complete the primary tank and the optional secondary tanks.
- Create the water-side connections of the control unit to the system.
- Create the interfaces according to the terminal plan.
- Install the water connections between optional secondary tanks to each other and to the primary tank.

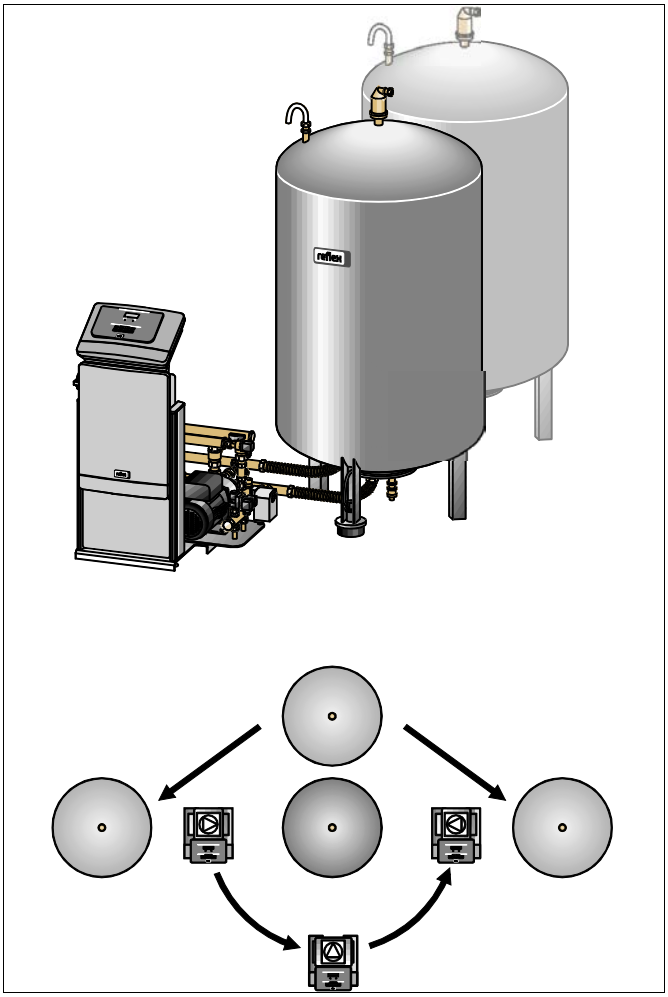
Notice!

For installation, note the operability of the valves and the inlet options of the connecting lines.

6.3.1 Positioning

Determine the positions for the control unit, the primary tanks and the secondary tanks (if used).

- Variomat 2-1:
  - The control unit can be installed on either side or in front of the primary tank. The distance of the control unit to the primary tank results from the connection set supplied.
- Variomat 2-2:
  - The control unit can be installed on either side or in front of the primary tank. The distance of the control unit to the primary tank results from the connection set supplied.



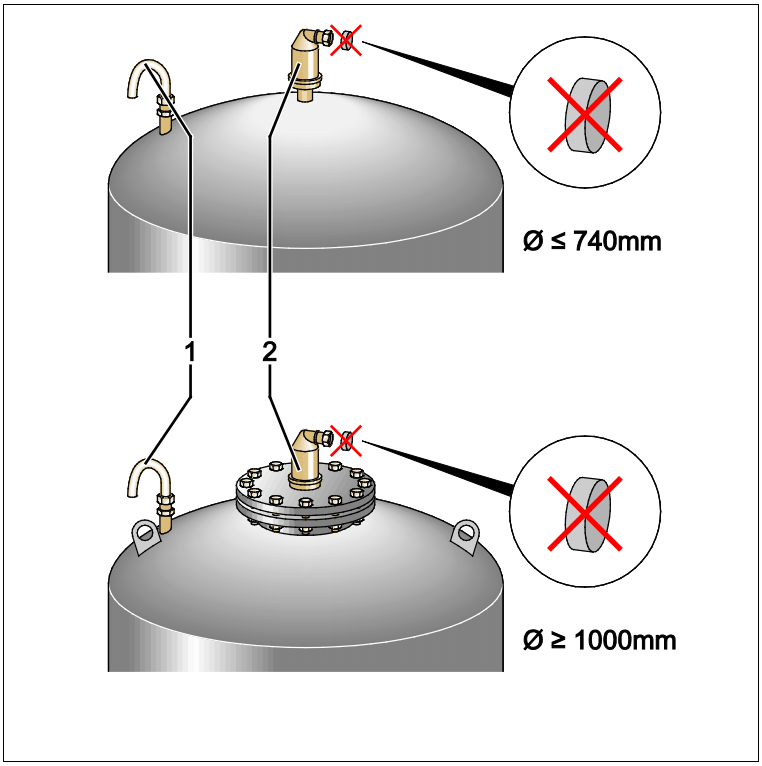
6.3.2 Installation of add-on components for the tanks

The add-on components are packed in plastic bags and attached to the base of the devices.

- For tanks up to 740 mm Ø.
  - "DV" degassing valve and reducing sleeve Rp 1/2 × Rp ⅜.
  - "VE" equalisation elbow.
- For tanks from 1000 mm Ø.
  - "DV" degassing valve and reducing sleeve Rp 1 × Rp ⅜.
  - "VE" equalisation elbow.

For add-on components, proceed as follows:

1. Seal the "DV" degassing valve and the reducing sleeve and assemble.
2. Install the assembly at the connection of the corresponding tank.
3. Remove the protective cap from the "DV" degassing valve.
4. Use the clamping ring screw connection to install the "VE" equalisation elbow for aeration and de-aeration at the tanks.



1	"VE" equalisation elbow	2	"DV" degassing valve with reducing sleeve

6.3.3 Tank installation

Attention! – Damage caused by improper installation

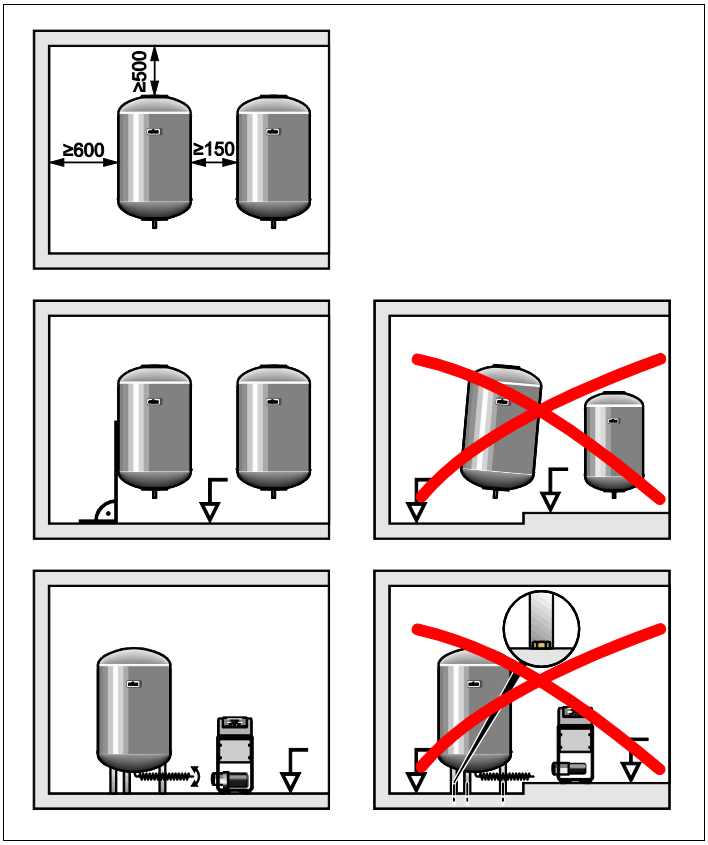
- Remember that the connection of pipelines or equipment originating with the system may cause additional stresses to the device.
  - Ensure a stress-free installation of the pipe connections between the device and the overall system.

Attention! – Equipment damage

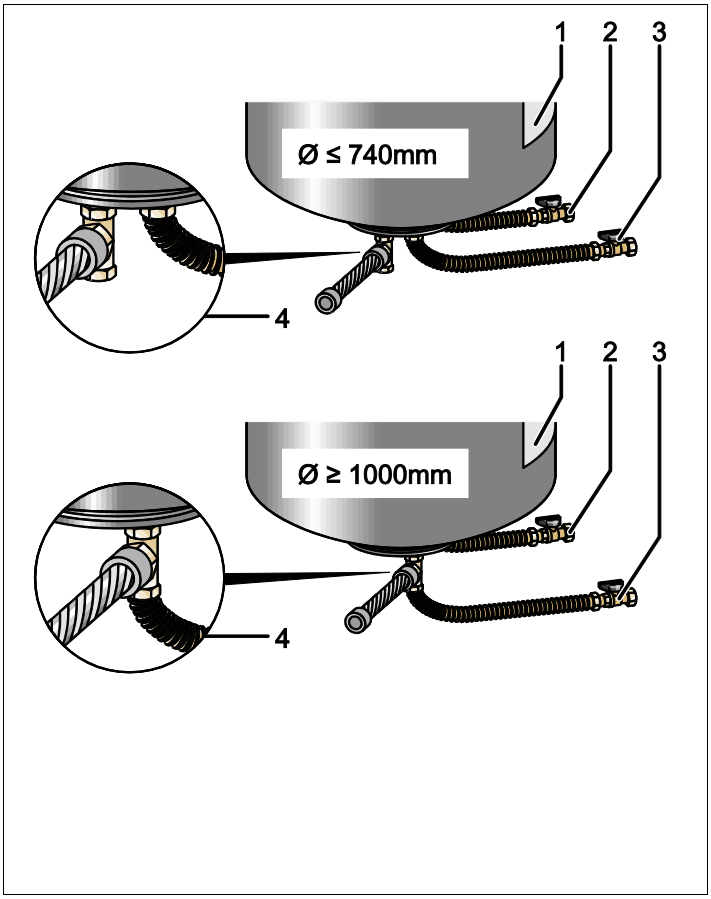
- The pump will be damaged if it is permitted to run dry.
  - Ensure that the connections for the overflow collector and the pump are not interchanged.
  - Ensure the correct connection of the pump to the primary tank.

Comply with the following notes regarding the installation of the primary tank and the secondary tanks:

- All flange openings at the tanks are viewing and maintenance openings. Install the primary tank and the secondary tanks, if provided, with sufficient spaces at the sides and the top.
- Install the tanks on a level plane.
- Ensure rectangular and free-standing position of the tanks.
- If you use secondary tanks in addition to the primary tank, ensure that all tanks have the same type and dimensions.
- Do not attach the tanks to the flooring to ensure the functioning of the "LIS" level sensor.
- Install the control unit on the same level as the tanks.



- Align the primary tank.
  - The label (1) is located directly above the connection (2) for the overflow collector.
  - The distance of the primary tank to the control unit must match the length of the connection set.
- Connect the connection set (2) and (3) with the screw fittings and gaskets to the connections at the lower tank flange of the primary tank.
  - Ensure that you connect the connection set for the overflow collector to the connection (2) with the label (1).
    - Interchanging the connections may cause the pump to run dry.
  - For tanks up to 740 mm Ø:
    - Connect the connection set (2) and (3) to the two free 1-inch barrel nipples at the tank flange.
    - Connect the connection set (4) of the secondary tank to the T-joint at the outlet of the tank flange.
  - For tanks from 1000 mm Ø:
    - Connect the connection set (2) to the 1-inch barrel nipple of the tank flange.
    - Connect the connection sets (3) and (4) to the T-joint at the 1-inch barrel nipple of the tank flange.



1	Adhesive label	3	"Pump" connection set
2	"Overflow collector" connection set	4	Secondary tank connection set

Notice!

If necessary, install the supplied connection set (4) at the secondary tank. Connect the connection set (4) with a user-supplied pipeline to the primary tank.

6.3.4 Hydraulic connection

6.3.4.1 Connection to the facility system

Caution – risk of burning!

- Hot water vapour can cause burns to skin and eyes.
  - Install the blow-off line from the control unit's safety valve so that a hazard to persons in the vicinity is excluded.

Attention! – Damage caused by improper installation

- Remember that the connection of pipelines or equipment originating with the system may cause additional stresses to the device.
  - Ensure a stress-free installation of the pipe connections between the device and the overall system.

Connection to the primary tank

The control unit is positioned to the primary tank as determined by the selected installation variant, and is connected to the tank using its connection set, see chapter 6.3.3 "Tank installation" on page 21 .

The connections to the system are identified by adhesive labels on the control unit:

Pumpen Zur Anlage

Pump to system connection

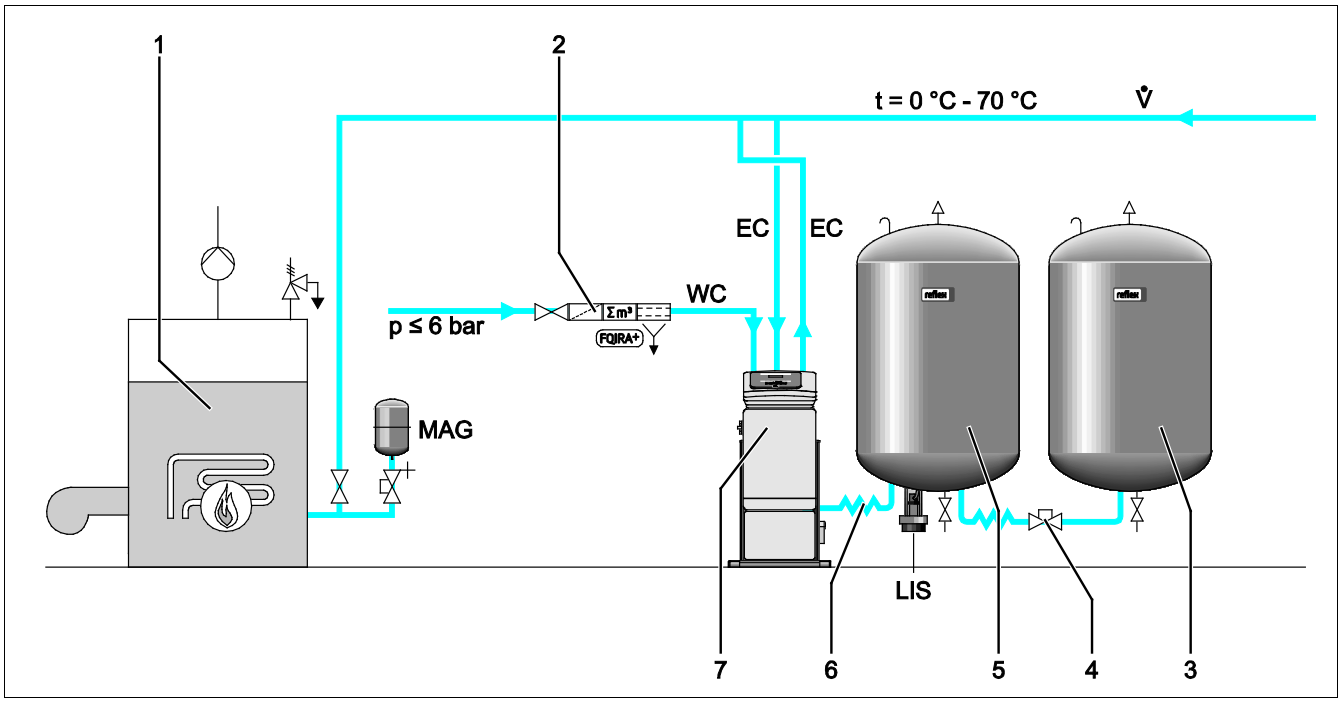
Überströmung Zur Anlage

Overflow valve to system connection

Nachspeisung Zum Behälter

Make-up to system connection

Connection to the system



1	Heat generator
2	For optional equipment and accessories, see chapter 4.6 "Optional equipment and accessories" on page 13 .
3	Secondary tank
4	Reflex rapid-action coupling R 1 x 1
5	Primary tank
6	Primary tank connection set

7	Control unit
EC	Degassing line • Gas-rich water from the system • Degassed water to the system
LIS	"LIS" level sensor
WC	Make-up line
MAG	Pressure expansion tank

If required, install a diaphragm expansion tank MAG ≥ 35 litres (Reflex N, for example). It reduces the switching frequency and can be also used in the individual protection of the heat generators. According to DIN / EN 12828, the installation of valves between the device and the heat generator is required for heating systems. Otherwise, protected shut-off devices must be installed.

Notice!

Due to the optimal degassing capacity of the device, we recommend the installation of a diaphragm expansion tank MAG ≥ 35 litre (Reflex N, for example).

"EC" expansion lines

Because of the degassing function, you must install two "EC" expansion lines.

- One line from the system for the gas-rich water.
- One line to the system for the degassed water.

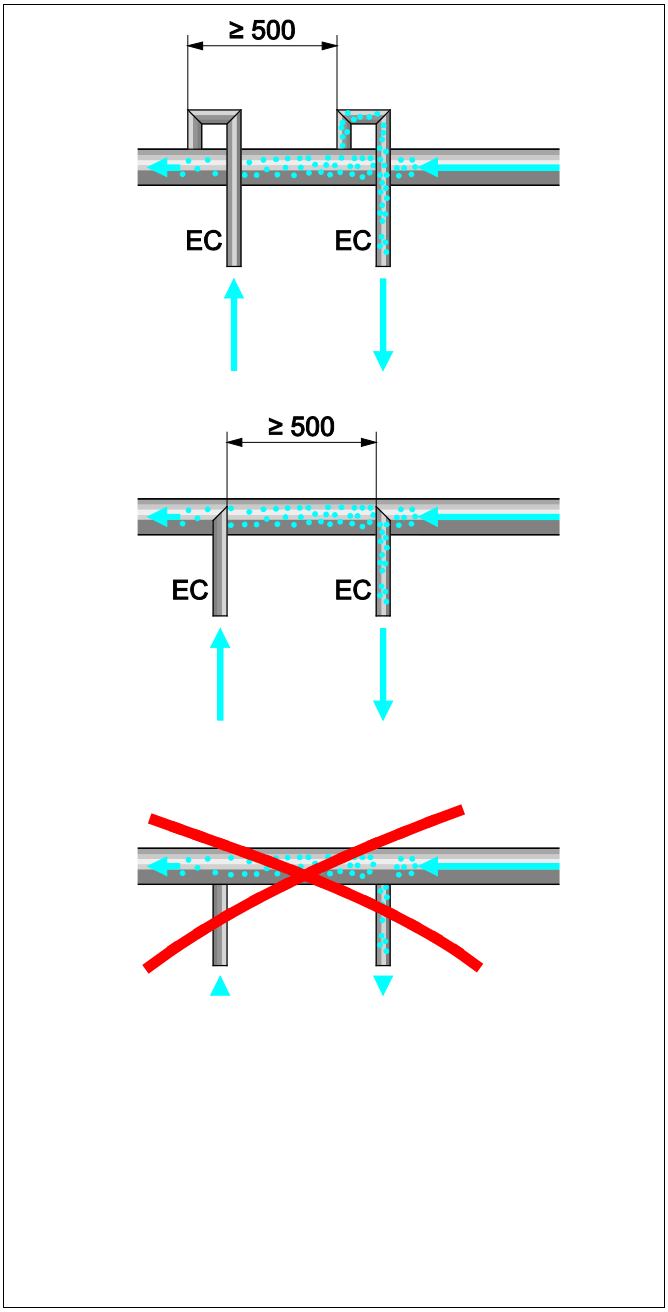
The "DN" nominal connection diameter for the "EC" expansion lines must be designed for the "P_0" minimum operating pressure.

	DNe 32	DNe 40	DNe 50
Variomat 2-1/...	X		
Variomat 2-2/35	X		
Variomat 2-2/... – $P_0 \leq 3.5$ bar			X
Variomat 2-2/... – $P_0 > 3.5$ bar		X	

Calculation P_0, see chapter 7.2 "Determining the P_0 minimum operating pressure for the controller" on page 38 .

The "DN" nominal connection diameter applies to an expansion line length of up to 10 metres. Beyond this length, select the next larger dimension. Integrate with the "V" main flow volume of the system. Viewed in system flow direction, you must integrate the gas-rich expansion line upstream of the expansion line transporting the degassed water.

Ensure that particulate dirt cannot enter and thus creating an overload of the "ST" dirt trap. Connect the "EC" expansion lines according to the following installation variants.



Notice!

The water temperature at the connection point of the "EC" expansion lines must be in the range of 0 °C to 70 °C. The use of in-line tanks does not increase the application range. Because the thermal protection is not ensured due to the flow during the degassing phase.

6.3.4.2 Make-up line

"WC" make-up line

See Chapter "Switching and make-up variants" for the various make-up variants, see chapter 6.4 "Switching and make-up variants" on page 28 .

If you don't connect the automatic water make-up, you must close the connection of the "WC" make-up line with a R ½ " blind plug.

Prevent a potential device fault by ensuring manual water make-up.

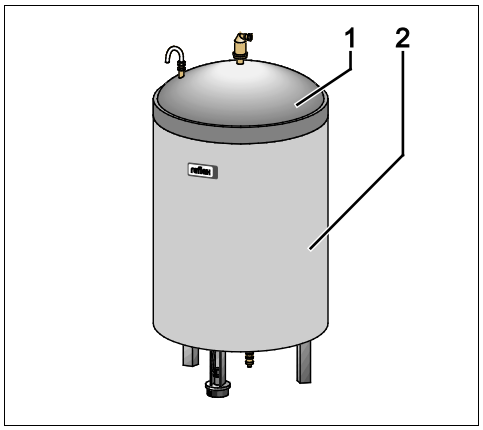
Install at least one "ST" dirt trap with a mesh size ≤ 0.25 mm close upstream to the make-up solenoid valve. Install a short line between the "ST" dirt trap and the solenoid valve.

Notice!

Use a pressure reducer in the "WC" make-up line if the idle pressure exceeds 6 bar.

6.3.5 Fitting the thermal insulation

Install the thermal insulation (2) around the primary tank (1) and close the insulation with the zip fastener.



Notice!

For heating systems, insulate the primary tank and the "EC" expansion lines against heat loss. The cover of the primary tank does not require insulation, as there is space between the diaphragm and the tank wall. The secondary tanks do not require insulation either.

Notice!

Condensate formation requires insulation by the user.

6.3.6 Fitting the level sensor

Attention! – Equipment damage

- Incorrect installation may result in damages to the "LIS" level sensor, malfunctioning and incorrect measurements from the pressure pick-up.
  - Comply with the instructions regarding the installation of the pressure pick-up.

The "LIS" level sensor uses a pressure pick-up. This pressure pick-up is to be installed after the primary tank has been placed at its final position, see chapter 6.3.3 "Tank installation" on page 21 . Comply with the following instructions:

- Remove the transport securing device (squared timber) at the vessel base of the primary tank.
- Replace this transport securing device with the pressure pick-up.
  - In the case of a tank volume of 1000 l (Ø 1000 mm) or more, use the supplied screws to attach the pressure pick-up at the vessel base of the primary tank.
- The vessel base must not be subject to stress after the pressure pick-up has been installed.
  - Avoid shock stresses by a subsequent alignment of the vessel, for example.
- Use flexible hoses to connect the primary tank and, if provided, the first secondary tank.
  - Use only the supplied connection sets.
- Perform a null balancing of the filling level when the primary tank is aligned and fully emptied, see chapter 9.4 "Configuring settings in the controller" on page 50 .

Standard values for level measurements:

Primary tank	Measuring range
200 l	0 – 4 bar
300 – 500 l	0 – 10 bar
600 – 1000 l	0 – 25 bar
1500 – 2000 l	0 – 60 bar
3000 – 5000 l	0 – 100 bar

6.4 Switching and make-up variants

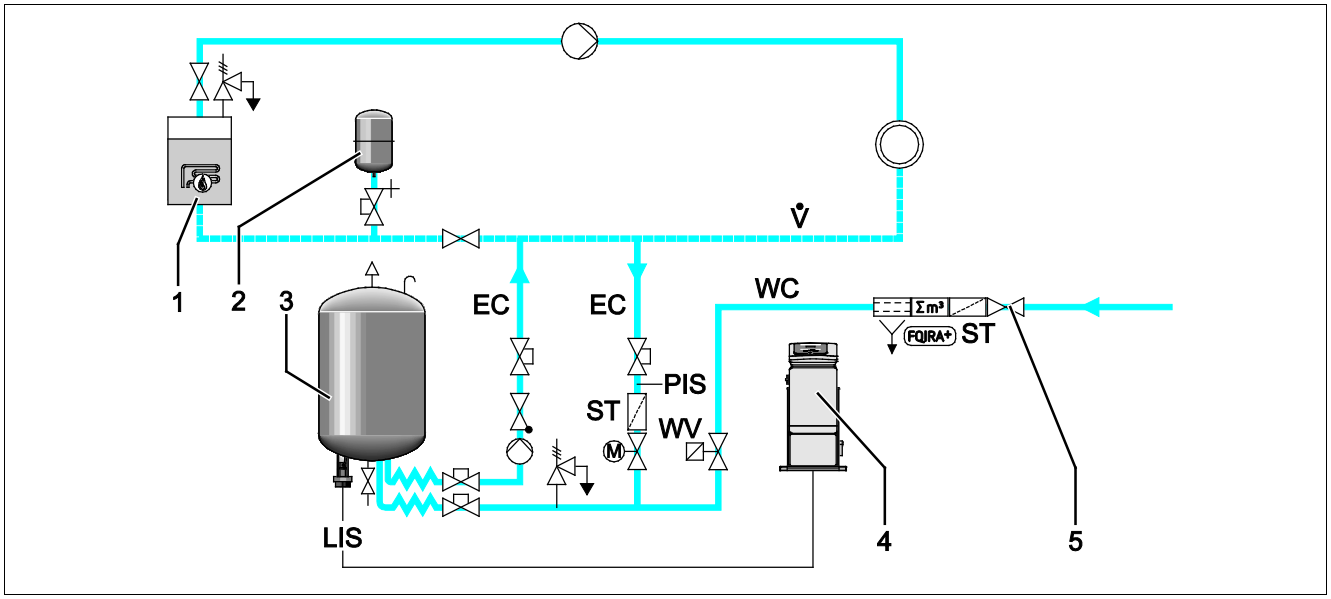
6.4.1 Function

The filling level is recorded in the primary tank by the "LIS" level sensor and evaluated in the controller. When the water level falls below the value specified in the controller's customer menu, the "WV" make-up valve opens.

Notice!

To complete the make-up function from the drinking water system, Reflex offers the Fillset with integrated system separator and Fillsoft softening equipment. Fillsoft is installed between Fillset and the device, see chapter 4.6 "Optional equipment and accessories" on page 13 .

6.4.1.1 Using a single-tank system



1	Heat generator
2	"MAG" pressure expansion tank
3	Primary tank
4	Control unit
5	Reflex Fillset, see chapter 4.6 "Optional equipment and accessories" on page 13 .
ST	Dirt trap

WC	Make-up line
PIS	Pressure transducer
WV	Make-up solenoid valve
EC	Degassing line • For gas-rich water from the system. • For degassed water into the system.
LIS	Level sensor

Single-tank system ≤ 350 kW, water temperature < 100 °C.

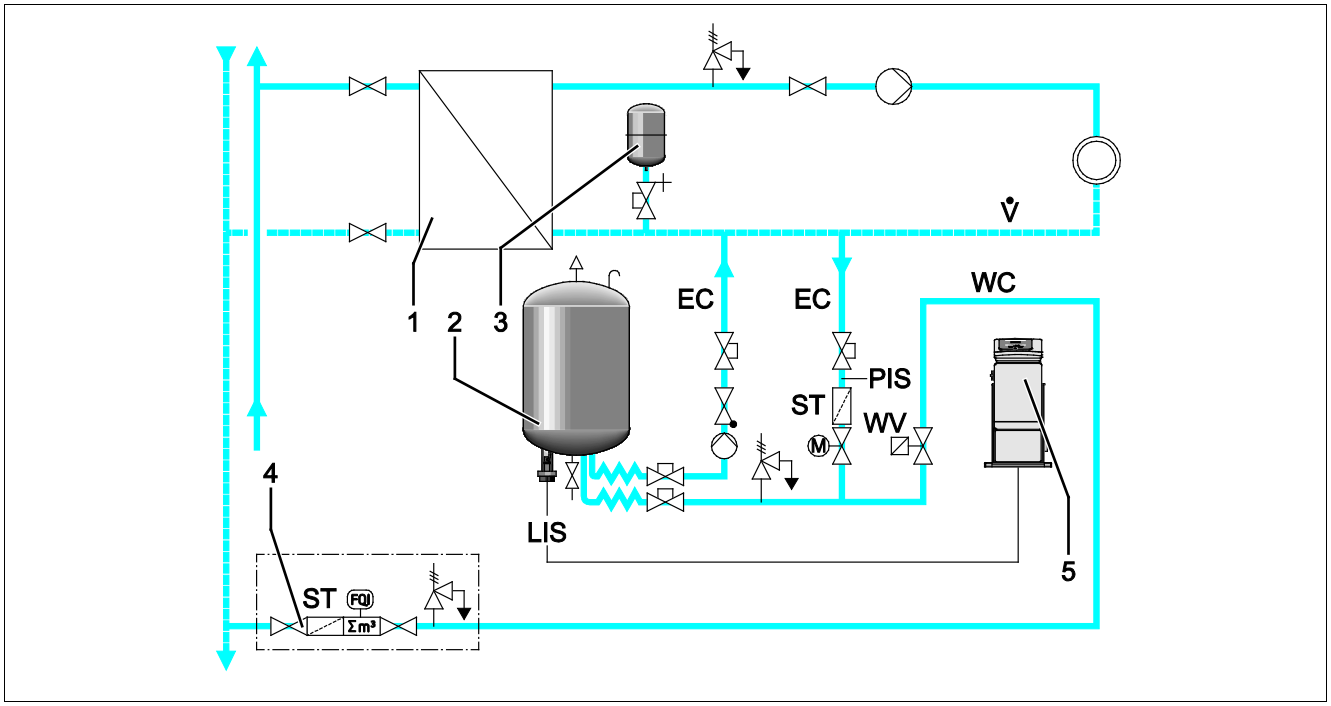
- Use the Reflex Fillset with integrated system separator when using drinking water for make-up.
  - If you don't use a Reflex Fillset, you must use an "ST" dirt trap with a mesh size ≥ 0.25 mm for the make-up.

Notice!

The quality of the make-up water must comply with the applicable standards such as VDI 2035.

- If you cannot meet this quality, use the Reflex Fillsoft to soften the make-up water from the potable water network, see chapter 4.6 "Optional equipment and accessories" on page 13 .

6.4.1.2 Using a district heating substation



1	District heating substation
2	Primary tank
3	"MAG" pressure expansion tank
4	User-supplied make-up unit
5	Control unit
WC	Make-up line

PIS	Pressure transducer
WV	Make-up solenoid valve
ST	Dirt trap
EC	Degassing line • For gas-rich water from the system. • For degassed water into the system.
LIS	Level sensor

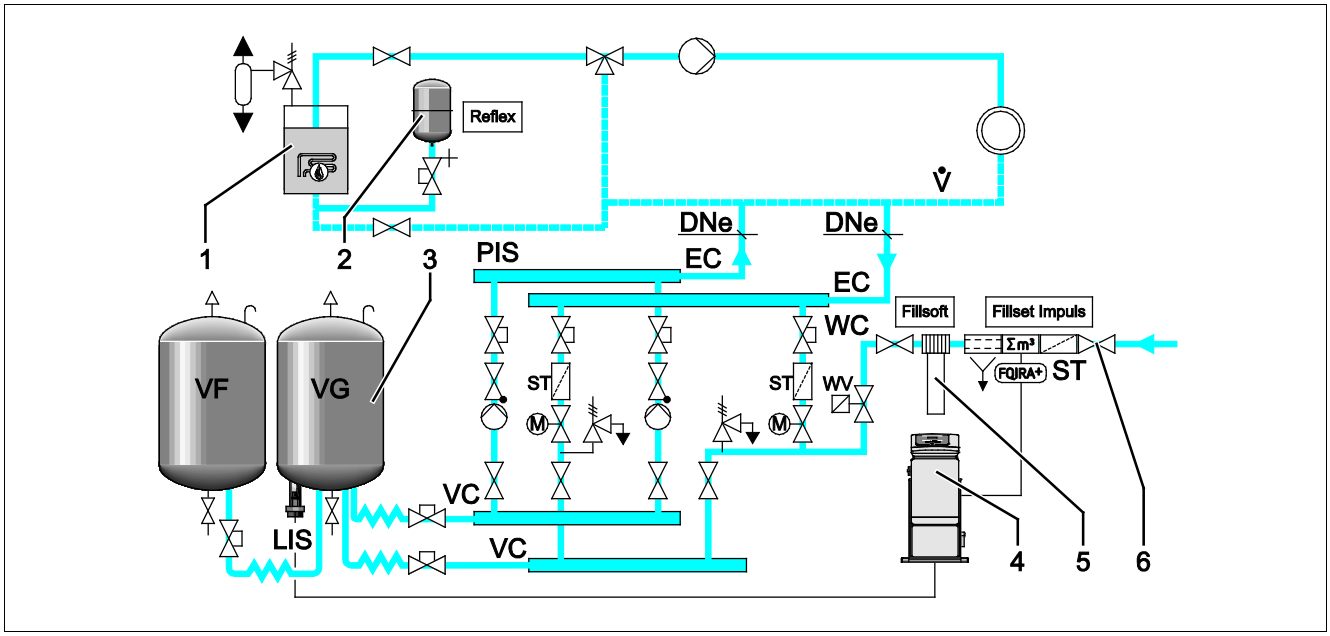
District heating water is particularly suited as make-up water.

- Water treatment is not necessary.
- Use an "ST" dirt trap with a mesh size ≥ 0.25 mm for the make-up.

Notice!

You require approval by the supplier of the district heating water.

6.4.1.3 Use in a system with central return flow admixture



1	"MAG" pressure expansion tank
2	Heat generator
3	Primary tank
4	Control unit
5	Reflex Fillsoft, see chapter 4.6 "Optional equipment and accessories" on page 13 .
6	Reflex Fillset Impulse, see chapter 4.6 "Optional equipment and accessories" on page 13 .

WC	Make-up line
PIS	Pressure transducer
WV	Make-up solenoid valve
ST	Dirt trap
EC	Degassing line • For gas-rich water from the system. • For degassed water into the system.
LIS	Level sensor

Using a softening system for the water make-up.

- Always integrate the device in the "V" main volume flow to ensure degassing the system water. It is the system side in systems with central return flow admixture or hydraulic switching points. The tank of the heat generator must be fitted with an individual protective device.
- When using Reflex Fillsoft softening systems, always install the Fillset Impulse.
  - The device controller evaluates the make-up quantities and signals a required replacement of the softening cartridges.

Notice!

The quality of the make-up water must comply with the applicable standards such as VDI 2035.

6.5 Electrical connection

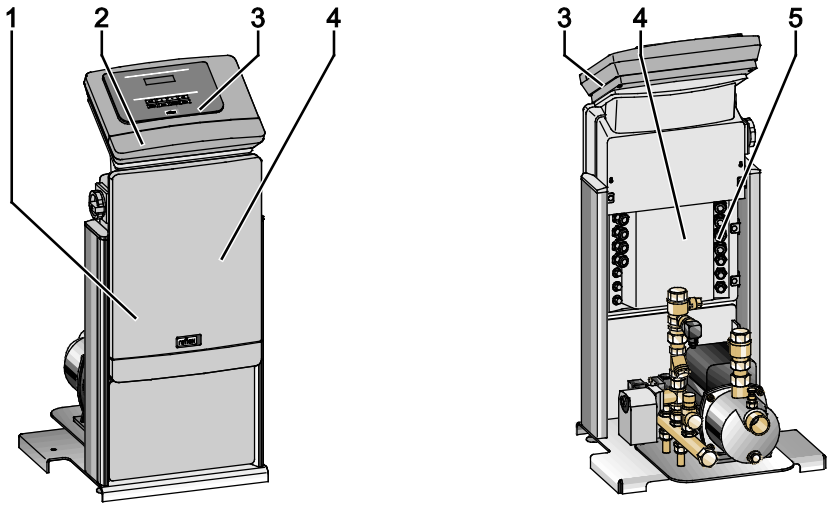
Danger – Electric shock!

- Serious injury or death due to electric shock.
  - Any system in which the device is to be installed must be de-energised.
  - Ensure that the system is locked and cannot be switched on by other personnel.
  - Installation work for the electric connection of the device must be carried out by an authorised electrician in compliance with electrical engineering regulations.

Danger – Electric shock!

- Serious injury or death due to electric shock. Some parts of the main board may still carry 230V voltage even with the device physically isolated from the 230 V power supply.
  - Before you remove the covers, completely isolate the device controller from the power supply.

For the electrical connection, you must differentiate between a connection component and an operating component.



Example: Control unit with one pump

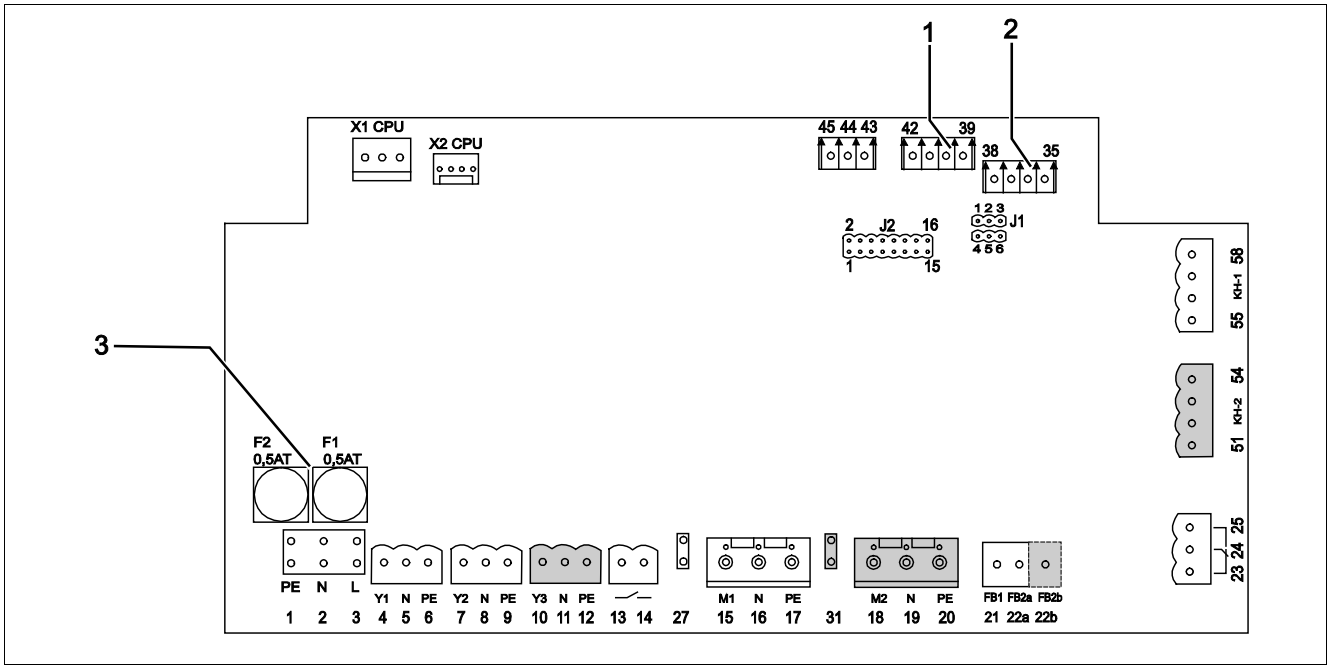
1	Connection component cover (hinged)
2	Operating component cover (hinged) • RS-485 interfaces • Pressure and Level outputs
3	Touch control

4	Connection component rear
5	Cable bushings • Supply and fusing • Floating contacts • "CO" compressor connection

The following descriptions apply to standard systems and are limited to the necessary user-provided connections.

1. Shut down the system and secure it against unintentional reactivation.
2. Remove the covers.
3. Insert a suitable screwed cable gland for the cable bushing at the rear of the connection component. M16 or M20, for example.
4. Thread all cables to be connected through the cable glands.
5. Connect all cables as shown in the terminal diagrams.
   - Connection component, see chapter 6.5.1 "Terminal plan, connection component" on page 32 .
   - Operating component, see chapter 6.5.2 "Terminal plan, operating unit" on page 34 .
   - Note that the fusing for the device connection is to be provided by the user, see chapter 5 "Technical data" on page 14 .

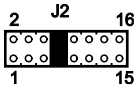
6.5.1 Terminal plan, connection component



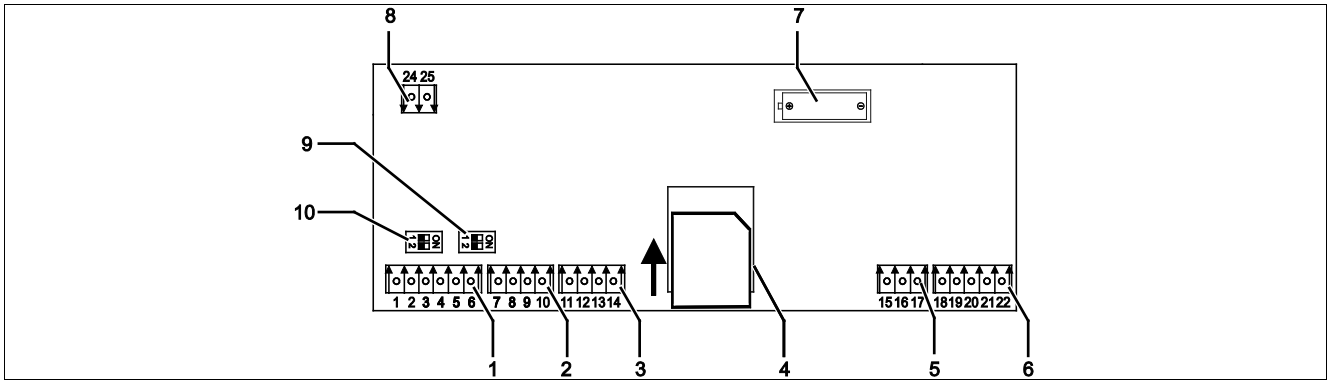
1	Pressure
2	Level

3	Fuses

Terminal number	Signal	Function	Wiring
Supply			
X0/1	L	230 V supply	On-site
X0/2	N		
X0/3	PE		
X0/1	L1	400 V supply	---
X0/2	L2		
X0/3	L3		
X0/4	N		
X0/5	PE		
Circuit board			
4	Y1	WV make-up solenoid valve	User, optional
5	N		
6	PE		
13		Dry-running protection message (floating)	User, optional
14			
23	NC	Group message (floating)	User, optional
24	COM		
25	NO		
35	+18 V (blue)	LIS level sensing analogue input at the primary tank	On-site
36	GND		
37	AE (brown)		
38	PE (shield)		

Terminal number	Signal	Function	Wiring
Circuit board			
39	+18 V (blue)	PIS pressure sensor analogue input at the primary tank	User, optional
40	GND		
41	AE (brown)		
42	PE (shield)		
43	+24 V	Digital inputs	User, optional
44	E1	E1: Contact water meter Jumper activation 	Factory-provided
1	PE	Voltage supply	Factory-provided
2	N		
3	L		
7	Y2	PV 1 overflow valve (motor ball valve)	---
8	N		
9	PE		
10	Y3	PV 2 overflow valve (motor ball valve)	---
11	N		
12	PE		
15	M1	PU 1 pump	Factory-provided
16	N		
17	PE		
18	M2	PU 2 pump, only in VS 2-2	Factory-provided
19	N		
20	PE		
21	FB1	Pump 1 voltage monitoring	Factory-provided
22a	FB2a	Pump 2 voltage monitoring	Factory-provided
22b	FB2b	External make-up request, together with 22a	Factory-provided
27	M1	Flat plug for supply, pump 1	Factory-provided
31	M2	Flat plug for supply, pump 2	Factory-provided
45	E2	E2: Insufficient water switch	---
51	GND	PV 2 overflow valve (motor ball valve), only in VS 2-2	Factory-provided
52	+24 V (supply)		
53	0 – 10 V (correcting variable)		
54	0 – 10 V (feedback)		
55	GND	PV 1 overflow valve (motor ball valve)	Factory-provided
56	+24 V (supply)		
57	0 – 10 V (correcting variable)		
58	0 – 10 V (feedback)		

6.5.2 Terminal plan, operating unit



1	RS-485 interfaces
2	I/O interface
3	I/O interface (reserve)
4	SD card
5	10 V supply

6	Analogue outputs for Pressure and Level
7	Battery compartment
8	Supply voltage, bus modules
9	RS–485 connection
10	RS–485 connection

Terminal number	Signal	Function	Wiring
1	A	RS-485 interface S1 networking	On-site
2	B		
3	GND S1		
4	A	RS-485 interface S2 modules: Expansion or communication module	On-site
5	B		
6	GND S2		
18	Y2PE (shield)	Analogue outputs: Pressure and Level Standard 4 – 20 mA	On-site
19	Pressure		
20	GNDA		
21	Level		
22	GNDA		
7	+5 V	I/O interface: Interface to the main circuit board	Factory
8	R × D		
9	T × D		
10	GND IO1		
11	+5 V	I/O interface: Interface to the main circuit board (reserve)	---
12	R × D		
13	T × D		
14	GND IO2		
15	10 V~	10 V supply	Factory
16			
17	FE		

6.5.3 RS-485 interface

Use theS1 and S2 RS-485 interfaces to retrieve all controller data and to enable the communication with control centres or other devices.

- S1 interface
  - Using this interface, you can operate maximum 10 devices in a master/slave network.
- S2 interface
  - "PIS" pressure and "LIS" level.
  - Operating modes of the "PU" pumps.
  - Operating states of the "PV" solenoid valve in the overflow line.
  - Operating states of the "WV" solenoid valve in the overflow line.
  - Cumulated quantity of the FQIRA + contact water meter.
  - All messages, see chapter 9.5 "Messages" on page 59 .
  - All entries in the fault memory.

6.5.3.1 Connecting the RS-485 interface

- Use a shielded cable to connect the interface to terminals 1 – 6 of the main board in the control cabinet.
  - For connecting the interface, see chapter 6.5 "Electrical connection" on page 31 .
- When using the device with a control centre not supporting an RS-485 interface (RS-232, for example), you must use a corresponding adapter.

Notice!

- For connecting the interface use only a cable with these properties.
  - LJYCY (TP), 4 × 2 × 0.8, maximum overall bus length 1000 m.

6.6 Installation and commissioning certificate

Data shown on the nameplate:	P_0
Type:	P_{SV}
Serial number:	

This device has been installed and commissioned in accordance to the instructions provided in the Operating Manual. The settings in the controller match the local conditions.

Notice!

When any factory-set values of the device are changed, you must enter this information in the Maintenance certificate, see chapter 10.4 "Maintenance certificate " on page 68 .

For the installation

Place, date	Company	Signature

For the commissioning

Place, date	Company	Signature

7 Commissioning

Notice!

The proper installation and commissioning must be confirmed in the installation, commissioning and maintenance certificate. This certificate is prerequisite for any warranty claim.

– Have the Reflex Customer Service carry out commissioning and the annual maintenance.

7.1 Checking the requirements for commissioning

The device is ready for commissioning when the tasks described in Chapter Installation have been concluded. Comply with the following instructions for commissioning:

- The control unit is connected to the primary tank and the secondary tanks, if provided.
- The water connections of the tanks to the facility system are established.
- The tanks are not filled with water.
- The valves for emptying the tanks are open.
- The facility system is filled with water and gas-vented.
- The electrical connection has been created according to applicable national and local regulations.

7.2 Determining the P_0 minimum operating pressure for the controller

The "P_0" minimum operating pressure is determined by the location of the pressure maintaining device. The controller calculates the switching points for the "PV" overflow valve and the "PU" pump from the "P_0" minimum operating pressure.

Actuating pressure for the safety valve "p_{sv}"

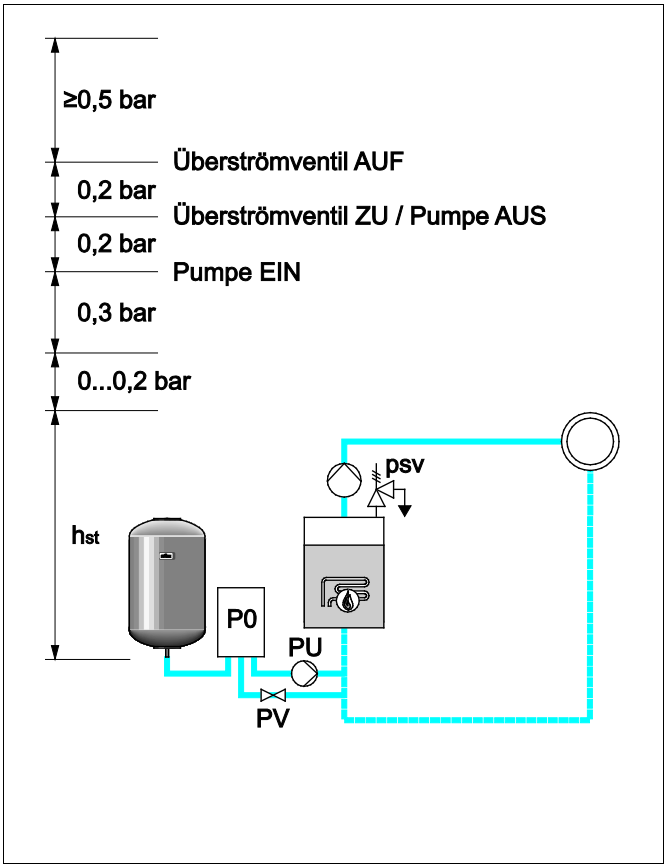
Overflow valve "OPEN" = final pressure "p_e"

Overflow valve "CLOSED" / Pump "OFF"

Pump "ON" = initial pressure "p_a"

Minimum operating pressure "P_0"

Static pressure "p_{st}"



The "P_0" minimum pressure is calculated as follows:

$P_0 = p_{st} + p_D + 0.2$ bar*	Enter the calculated value in the start routine of the controller, see chapter 7.3 "Modifying the controller's start routine" on page 39 .
$p_{st} = h_{st}/10$	h_{st} in metres
$p_D = 0.0$ bar	for safety temperatures ≤ 100 °C
$p_D = 0.5$ bar	for safety temperatures = 110 °C

*Addition of 0.2 bar recommended, no addition in extreme cases

Calculation example for "P_0" minimum operating pressure:

Heating system: Static height 18 m, run-on temperature 70 °C, safety temperature 100 °C.

Calculation example:

$P_0 = p_{st} + p_D + 0.2$ bar*

$p_{st} = h_{st}/10$

p_{st}=18 m/10

$p_{st} = 1.8$ bar

$p_D = 0.0$ bar at a safety temperature of 100 °C

$P_0 = 1.8$ bar + 0 bar + 0.2 bar

$P_0 = 2.0$ bar

Notice!

Avoid dropping below the "P_0"minimum operating pressure. Vacuum, vaporisation and cavitation are thus excluded.

7.3 Modifying the controller's start routine

During commissioning, you must once execute the start routine.

– For executing the start routine, see chapter 9.3 "Modifying the controller's start routine" on page 47 .
– For information about controller operation, see chapter 9.1 "Operator panel" on page 45 .

7.4 Filling the tanks with water

The following information applies to the devices:

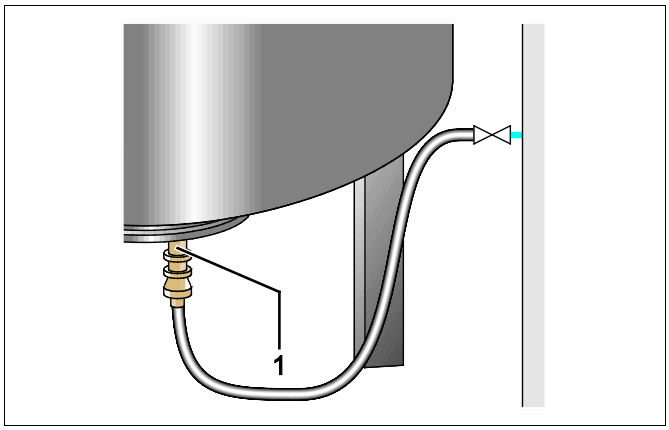
- Control unit and primary tank.
- Control unit and primary tank and one secondary tank.
- Control unit and primary tank and more than one secondary tanks.

Facility system	System temperature	Filling level of primary tank
Heating system	≥ 50 °C	Approx. 30 %
Cooling system	< 50 °C	Approx. 50 %

7.4.1 Filling with a hose

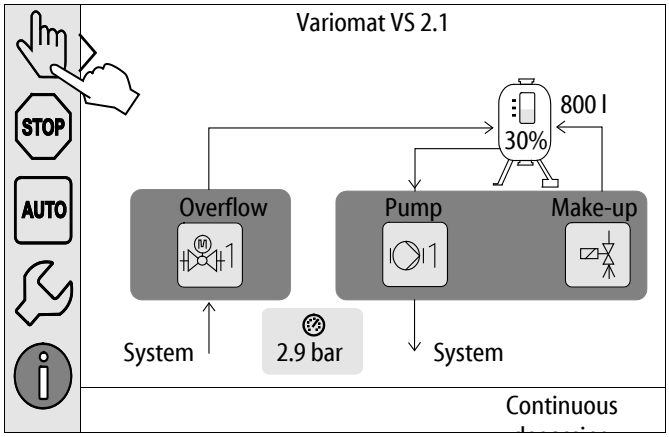
Preferably use a water hose to fill the primary tank with water when the automatic make-up device is not yet connected.

- Use a vented water hose filled with water.
- Connect the water hose to the external water supply and the "FD" feed and drain cock (1) at the primary tank.
- Check whether the shut-off valves between control unit and primary tank are open (supplied pre-wired in open position).
- Fill the primary tank with water until the filling level has been reached.



7.4.2 Filling with the solenoid valve in the make-up

1. Use the "Manual mode" button to switch to "Manual" mode.
2. Press the corresponding button for the "WV make-up valve" until the specified filling level is reached.
   – Continuously monitor this process.
   – If a high water alarm is issued, the "WV" make-up valve" will be automatically closed.



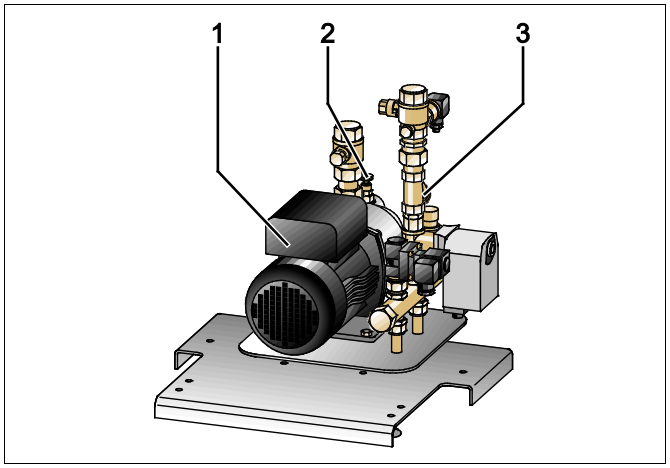
7.5 Venting the pump

Caution – risk of burning!

- Risk of burning from escaping medium.
  - Maintain sufficient distance from the escaping medium.
  - Wear suitable personal protective equipment (safety gloves and goggles, for example).

Vent the "PU" pump as follows:

- Remove the vent screw (2) from the pump (1) and vent the pump until bubble-free water escapes.
- Screw the vent screw (2) back in and tighten.
- Check the vent screw (2) for leaks.



1	"PU" pump
2	"AV" vent screw
3	"ST" dirt trap

Notice!

Repeat the venting process if the pump does not deliver.

7.6 Parametrising the controller in the Customer menu

Use the Customer menu to display or correct system-specific values. In the course of commissioning, the factory settings must be adjusted for the system-specific conditions.

– For adjusting the default settings, see chapter 9.4 "Configuring settings in the controller" on page 50 .
– For information about controller operation, see chapter 9.1 "Operator panel" on page 45 .

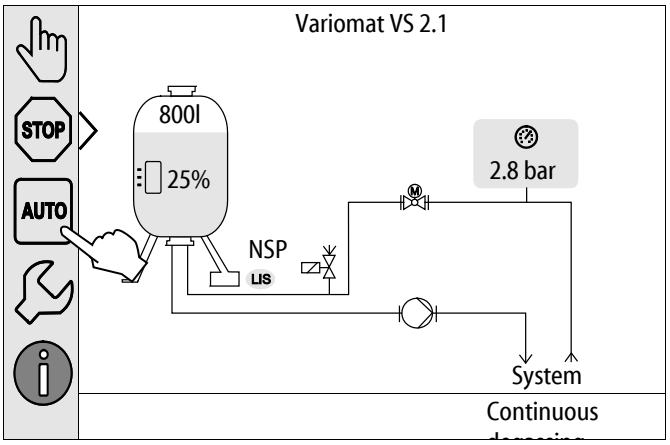
7.7 Starting Automatic mode

Automatic operation is executed as conclusion of the initial commissioning. The following prerequisites must be met for automatic operation:

- The device is filled with compressed air and water.
- All required settings are defined in the controller.

Start the automatic mode at the operator panel of the controller.

1. Press "AUTO".
   – The "PU" pump and the "PV" overflow valve are regulated so that the pressure remains constant at a regulation of ± 0.2 bar.
   – Faults are displayed and evaluated.



Notice!
The commissioning process is now concluded.

Notice!
The "ST" dirt trap in the "DC" degassing line must be cleaned after the expiry of the continuous degassing time at the latest, see chapter 10.2.1 "Cleaning the dirt trap" on page 64 .

8 Operation

8.1 Operating modes

8.1.1 Automatic mode

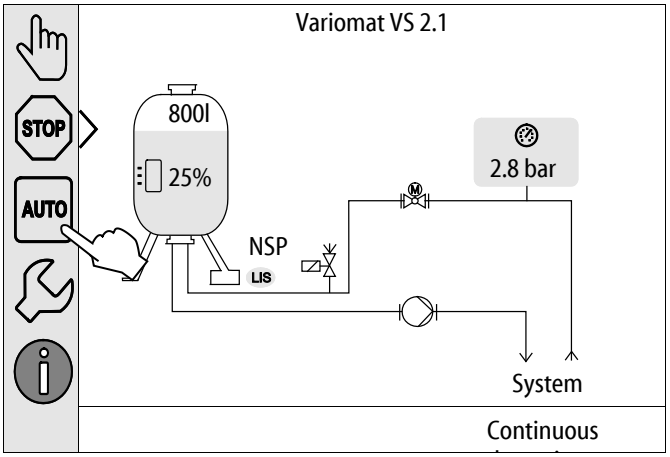
After successful commissioning, start the Automatic mode from the device. The controller monitors the following functions:

- Maintain pressure
- Compensate expansion volume
- Degas
- Automatic make-up

To start the Automatic mode, proceed as follows:

1. Press "AUTO“.
   - The "PU" pumps and the "PV" overflow valves are regulated so that the pressure remains constant at a regulation of ± 0.2 bar.
   - Faults are displayed and evaluated.

Automatic mode is activated.



8.1.2 Manual mode

The manual mode is intended for test and service tasks.

Manual mode enables you to select the following functions and to perform a test run:

- "PU" pump.
- "PV1" overflow solenoid valve.
- "WV1"solenoid valve for the make-up.

You have the option to simultaneously switch multiple functions and to test them in parallel. Switch the function on and off by touching the corresponding button:

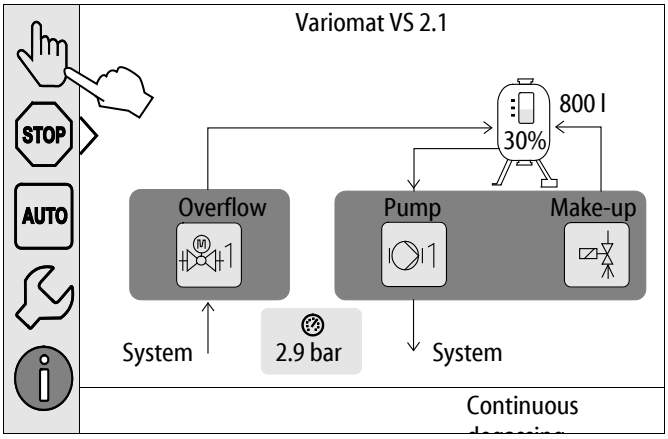
– The button has a green background. The function is switched off.

Press the desired button:

– The button has a blue background. The function is switched on.

1. Press "Manual mode“.
2. Select the desired function.
   - "PU1" = Pump
   - "PV1" = Overflow valve
   - "WV1" = Make-up solenoid valve

The controller displays the change of the filling level and the pressure of the tank.



Überstr.	"PV1" overflow valve (motor ball valve)
Nachsp.	Solenoid valve of the "WV1" make-up

Notice!

Manual operation can not be performed if safety-relevant parameters are exceeded.

– Switching is blocked if safety-relevant parameters are exceeded.

8.1.3 Stop mode

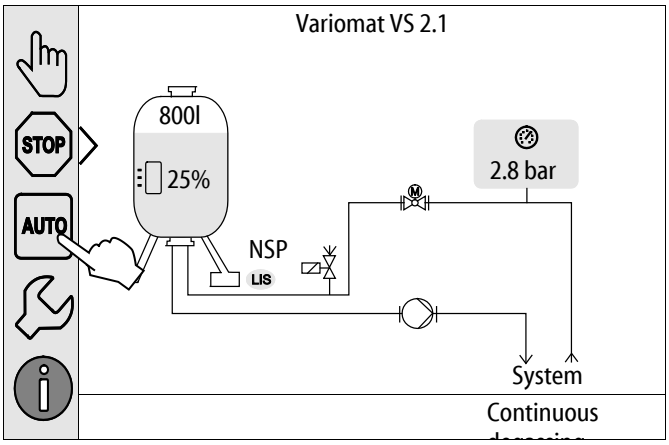
The Stop mode is intended for the device commissioning.

Except for the display of information, the device is non-functional in Stop mode. Function monitoring is stopped.

The following functions are deactivated:

- The "PU" pump is switched off.
- The solenoid valve in the "PV" overflow line is closed.
- The solenoid valve in the "WV" make-up line is closed.

1. Press "STOP".



Notice!

The system returns an alarm if the Stop mode is activated for more than 4 hours.

– If "Floating alarm contact?" in the Customer menu is set to "Yes", the system outputs the alarm to the group alarm contact.

8.1.4 Summer operation

The degassing of the network water is not necessary if the circulating pumps of the system are shut down during Summer because gas-rich water cannot reach the device.

In this event, use the Customer menu to shut-down interval degassing to save energy.

After Summer, select the "Interval degassing" degassing programme in the Customer menu or "Continuous degassing", if required.

For a detailed description of the selection of degassing programmes, see chapter 9.4.4 "Setting degassing programmes" on page 56 .

Notice!

The pressure maintaining feature of the device must remain operative in Summer.

8.2 Restarting

Caution – Risk of injury due to pump start!

- Injuries to your hand and damage to property at the pump due to a pump start.
  – De-energise the pump prior to turning the pump at the fan wheel with a screwdriver.

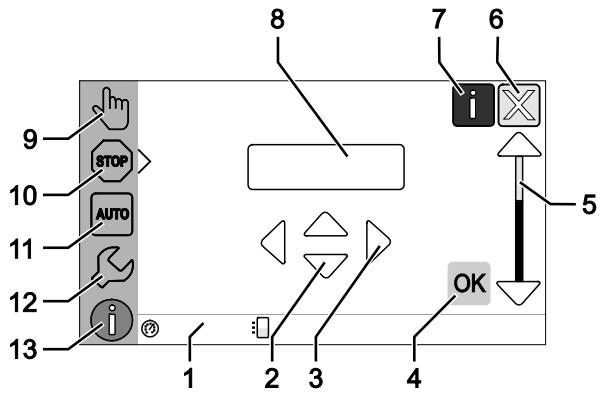
After an extended standstill time (the device is de-energised or in Stop mode), the "PU" pump may jam. For this reason, use a screwdriver to rotate the pump at the fan wheel of the pump motor before restarting.

Notice!

A jamming of the "PU" pump is prevented during operation thanks to forced starting action (after 24 hours).

9 Controller

9.1 Operator panel



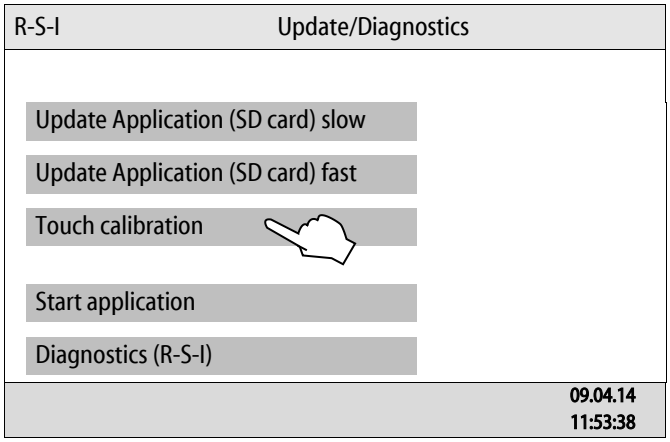
1	Message line
2	"Up" and "Down" buttons • Set digits.
3	"Right" and "Left" buttons • Select digits
4	"OK" button • Confirm/acknowledge input • Scroll in the menu
5	"Up" and "Down" scroll bar • "Scroll" in the menu
6	"Scroll back" button • Cancel • Move backward up to the main menu
7	"Display help texts" button • Opens help texts

8	Display value
9	"Manual mode" button • For function tests
10	"Stop mode" button • For commissioning
11	"Automatic mode" button • For continuous operation
12	"Set-up menu" button • For the setting of parameters • Fault memory • Parameter memory • Display settings • Primary tank information • Software version information
13	"Info menu" button • Displays general information

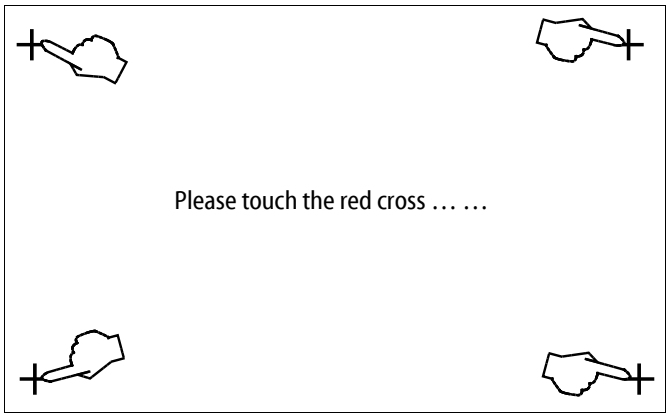
9.2 Calibrating the touch screen

You can calibrate the touch screen when touching the desired buttons does not work satisfactorily.

1. Switch the device off at the main switch.
2. Touch and hold with your finger the touch field.
3. Switch on the main switch while touching the touch field.
   – When starting the program, the controller automatically switches to the "Update/Diagnostics" function.
4. Touch the "Touch calibration" button.



5. Touch the displayed crosses on the touch screen after each other.
6. Switch the device off and on again at the main switch.



The touch screen is fully calibrated.

9.3 Modifying the controller's start routine

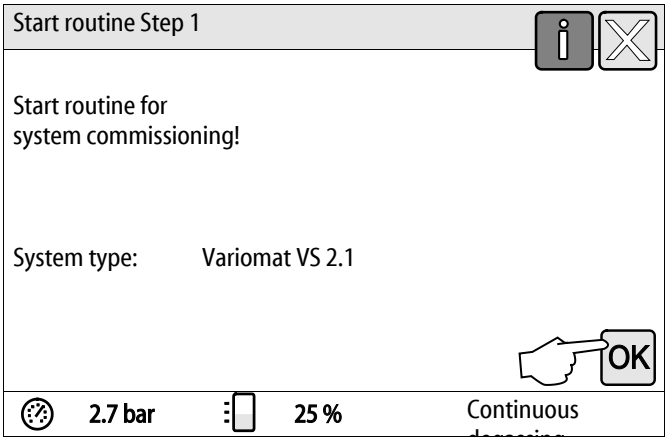
The start routine is used to set the required parameters for the device commissioning. It commences with the first activation of the controller and can be run only once. Parameters can be changed or checked in the customer menu after the start routine has terminated see chapter 9.4.1 "Customer menu" on page 50 .

A three-digit PM code is assigned to the setting options.

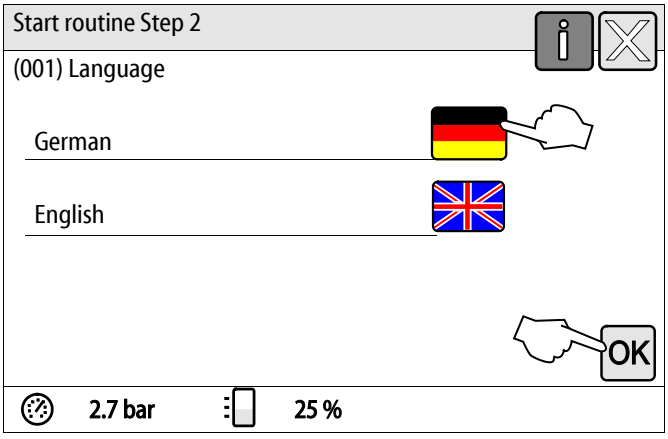
Step	PM code	Description
1		Start of the start routine
2	001	Select the language
3		Remember: Prior to installation and commissioning, read the operating manual!
4	005	Set the "P_0" minimum operating pressure, see chapter 7.2 "Determining the P_0 minimum operating pressure for the controller" on page 38 .
5	002	Set the time
6	003	Set the date
7	121	Select the primary tank nominal volume
8		Null balancing: The primary tank must be empty! The system checks whether the signal from the level sensor matches the selected primary tank.
		End of the start routine. The stop mode is active.

The system automatically displays the first page of the start routine when you switch on the device for the first time.

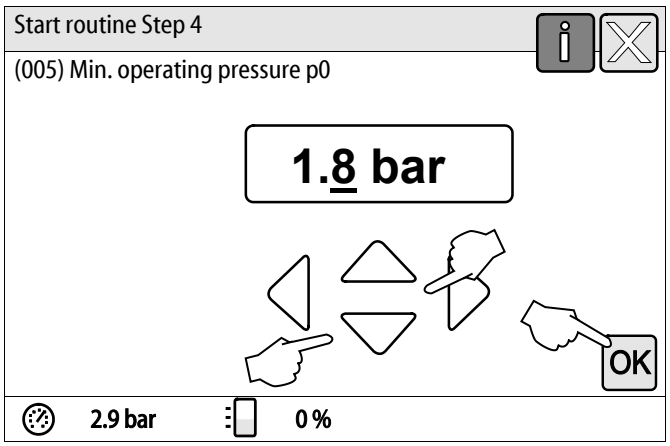
1. Press "OK".
   – The start routine moves to the next page.



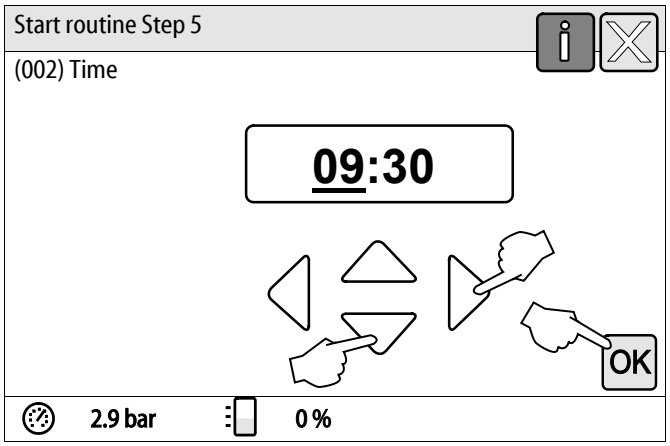
2. Select the required language and conform your entry with "OK".



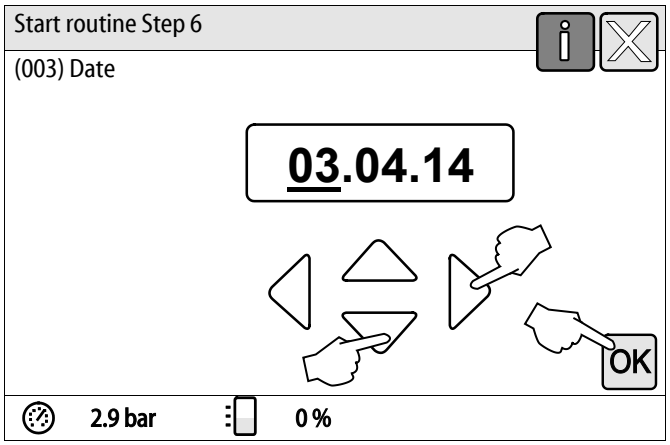
3. Select the calculated minimum operating pressure and conform your entry with "OK".
   - Calculating the minimum operating pressure, see chapter 7.2 "Determining the P_0 minimum operating pressure for the controller" on page 38 .



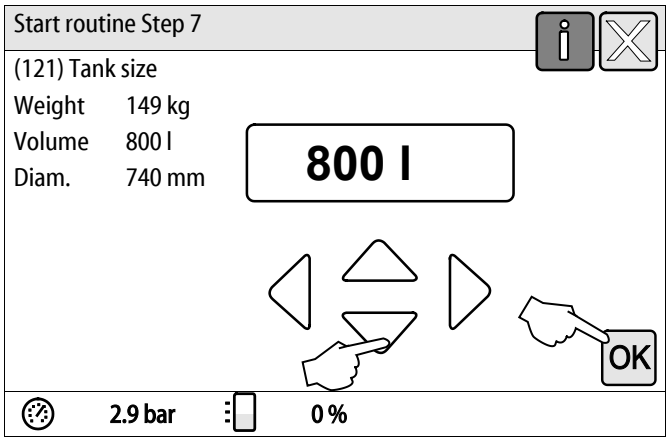
4. Set the time.
   – Use the "Left" and "Right" buttons to select the display value.
   – Use the "Up" and "Down" buttons to change the display value.
   – Confirm your entries with "OK".
   - The time of an alarm will be stored in the fault memory of the controller.



5. Set the date.
   – Use the "Left" and "Right" buttons to select the display value.
   – Use the "Up" and "Down" buttons to change the display value.
   – Confirm your entries with "OK".
   - The date of an alarm will be stored in the fault memory of the controller.

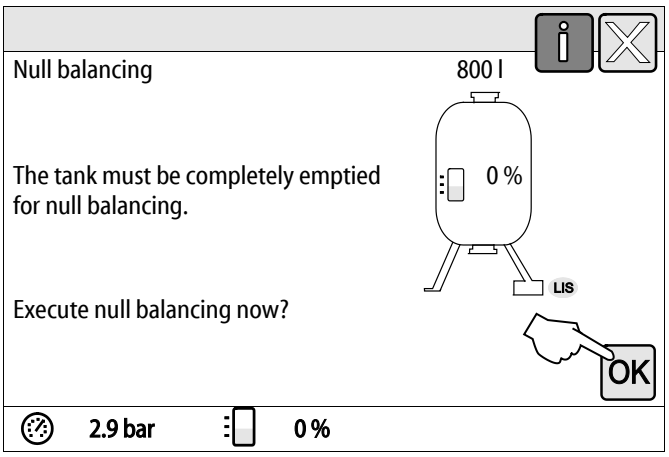


6. Select the size of the primary tank.
   – Use the "Up" and "Down" buttons to change the display value.
   – Confirm your entries with "OK".
   – For the primary tank data, see the name plate or see chapter 5 "Technical data" on page 14 .



– The controller checks whether the level measuring signal matches the dimensional data of the primary tank. The primary tank must be fully emptied, see see chapter 6.3.6 "Fitting the level sensor" on page 27 .

7. Press "OK".
   – Null balancing is executed.
   – If null balancing is not successfully completed, you cannot commission the device. In this event, please contact Customer Service, see chapter 12.1 "Reflex Customer Service" on page 71 .



Notice!

After successful conclusion of the start routine, you are in Stop mode. Do not yet switch to Automatic mode.

9.4 Configuring settings in the controller

You can configure the controller settings regardless of the currently selected and active operating mode.

9.4.1 Customer menu

9.4.1.1 Customer menu – overview

Use the Customer menu to correct or determine system-specific values. In the course of commissioning, the factory settings must be adjusted for the system-specific conditions.

Notice!

Operation description, see chapter 9.1 "Operator panel" on page 45 .

A three-digit PM code is assigned to the setting options.

PM code	Description
001	Select the language
002	Set the time
003	Set the date
	Execute null balancing – The primary tank must be empty! – The system checks whether the signal from the level sensor matches the selected primary tank.
005	Set the "P_0" minimum operating pressure, see chapter 7.2 "Determining the P_0 minimum operating pressure for the controller" on page 38 .
	Degassing >
010	• Degassing programme • No degassing • Continuous degassing • Interval degassing • Run-on degassing
011	• Continuous degassing time
	Make-up >
021	• Make-up ON at … %
022	• Make-up OFF at … %
023	• Maximum make-up time …min
024	• Maximum make-up cycles … /2 h
027	• With contact water meter "Yes/'No" – If "Yes", continue with 028
028	• Reset make-up quantity "Yes/No"
029	• Maximum make-up quantity ... l
030	• With softening "Yes/'No" – If "Yes", continue with 031
031	• Block make-up "Yes/No" (if water capacity is exhausted)
033	• Hardness reduction … °dH = GHactual – GHtarget
032	• Soft water capacity • Fillsoft I: Soft water capacity = 6000 l / hardness reduction • Fillsoft II: Soft water capacity = 12000 l / hardness reduction

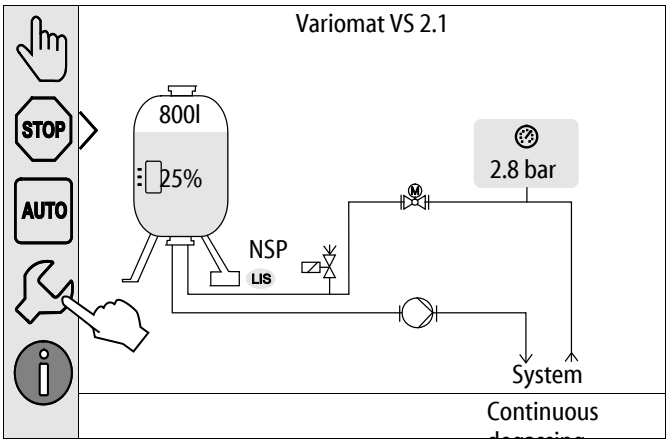
PM code	Description
034	• replacement interval… months (for softening cartridges according to manufacturer).
007	Maintenance interval… months
008	Floating contact • Message selection > • Message selection: only messages marked with "√" are output. • All messages: All messages are output.
	Fault memory > History of all messages
	Parameter memory > History of parameter input
	Display settings > Brightness, screen saver
009	• Brightness … %
010	• Screen saver brightness … %
011	• Screen saver delay …min
	Information > • Tank: Tank information • Software version

9.4.1.2 Setting the customer menu - "Time" example

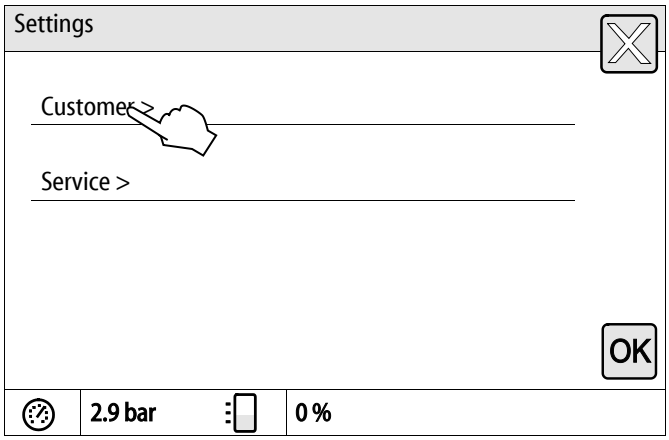
The setting of system-specific values is explained below using the setting of the time as example.

To adjust the system-specific values, proceed as follows:

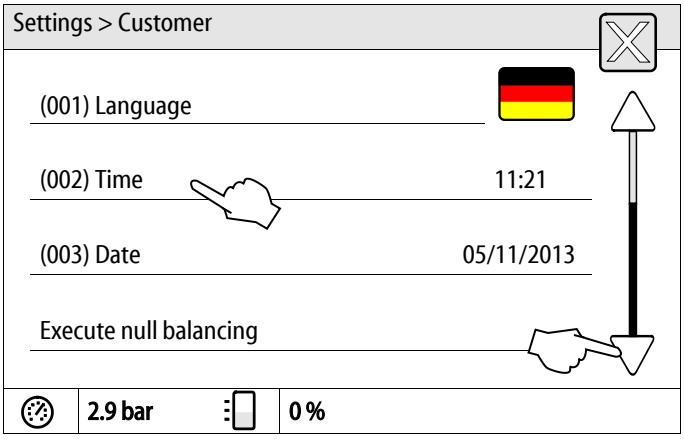
1. Press "Settings".
   - The controller switches to the setting area.



2. Press "Customer >".
   - The controller opens the Customer menu.



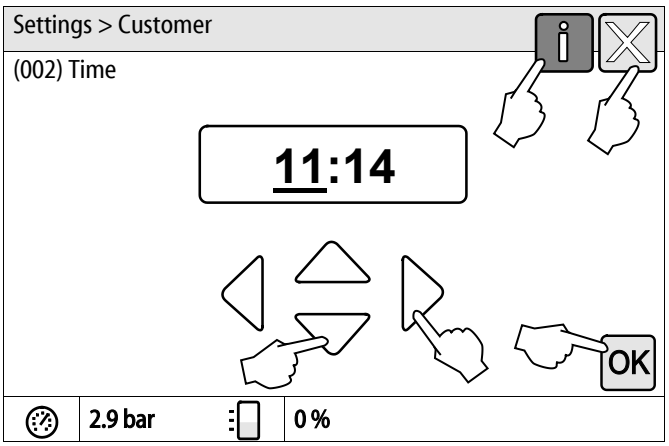
3. Press the required area.
   - The controller switches to the selected area.
   - Use the scroll bar to navigate through the list.



4. Set the system-specific values for the individual areas.
   - Use the "Left" and "Right" buttons to select the display value.
   - Use the "Up" and "Down" buttons to change the display value.
   - Confirm your entries with "OK".

   Press "i“ to display a help text for the selected area.

   Press "X“ to cancel your input without saving the new settings. The controller automatically opens again the list.



9.4.2 Service menu

This menu is protected with a password. It can be accessed only by the Reflex Customer Service. A partial summary of the settings stored in the Service menu is proved in the Chapter Default settings, see chapter 9.4.3 "Default settings" on page 54 .

9.4.3 Default settings

The device controller is shipped with the following default settings. Use the Customer menu to adjust these values to local conditions. In specific cases, it is possible to further adjust the values in the Service menu.

Customer menu

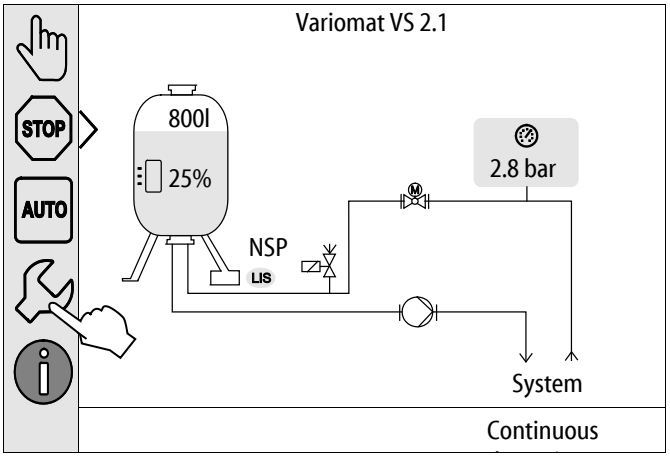
Parameter	Setting	Remarks
Language	EN	Display language.
Minimum operating pressure "P_0"	1.8 bar	see chapter 7.2 "Determining the P_0 minimum operating pressure for the controller" on page 38 .
Next maintenance	12 months	Time left to the next due maintenance.
Floating alarm contact	All	see chapter 9.5 "Messages" on page 59 .
Make-up		
Make-up "ON"	20 %	
Make-up "OFF"	25 %	
Maximum make-up quantity	0 Litres	Only when "With water meter Yes" has been selected in the Customer menu under Make-up.
Maximum make-up time	20 minutes	
Maximum make-up cycles	3 cycles within 2 hours	
Degassing		
Degassing programme	Continuous degassing	
Continuous degassing time	12 hours	Default setting
Softening (Only if "With softening Yes")		
Lock make-up	No	In the case of soft water residual capacity = 0
Hardness reduction	8°dH	= Target – Actual
Maximum make-up quantity	0 Litres	
Soft water capacity	0 Litres	
Cartridge replacement	18 months	Replace cartridge.

Service menu

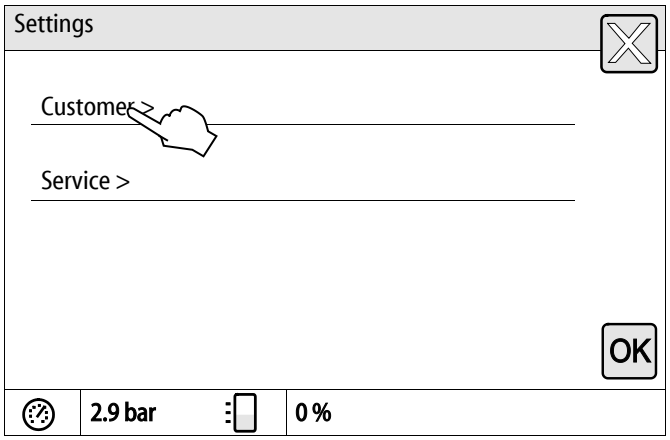
Parameter	Setting	Remarks
Maintain pressure		
Pump "ON"	P_0 + 0.3 bar	Differential pressured added to the "P_0" minimum operating pressure.
Pump "OFF"	P_0 + 0.5 bar	Differential pressured added to the "P_0" minimum operating pressure.
Forced pump start	24 h	If the pump is standing still for 24 hours, it is forced to run for 3 seconds.
"Pump run time exceeded" message	30 minutes	The message is displayed after the pump runs for 30 minutes.
Overflow line "CLOSED"	P_0 + 0.5 bar	Differential pressured added to the "P_0" minimum operating pressure.
Overflow line "OPEN"	P_0 + 0.7 bar	Differential pressured added to the "P_0" minimum operating pressure.
Maximum pressure	P_0 + 3 bar	Differential pressured added to the "P_0" minimum operating pressure.
Degassing		
Degassing time of interval degassing mode	90 seconds	
Idling time of interval degassing mode	120 minutes	
Interval degassing start	08:00 h	
Interval degassing end	18:00 h	
Filling levels		
Insufficient water "ON"	6 %	The "PU" pump is activated at a minimum filling level of 6 % in the primary tank.
Insufficient water "OFF"	12 %	The "PU" pump is deactivated at a filling level of 12 % in the primary tank.
Solenoid valve in overflow line "CLOSED"	90 %	

9.4.4 Setting degassing programmes

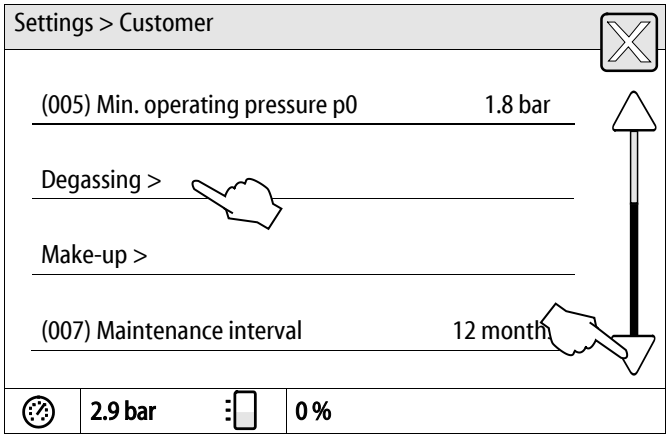
1. Press "Settings".
   – The controller switches to the setting area.



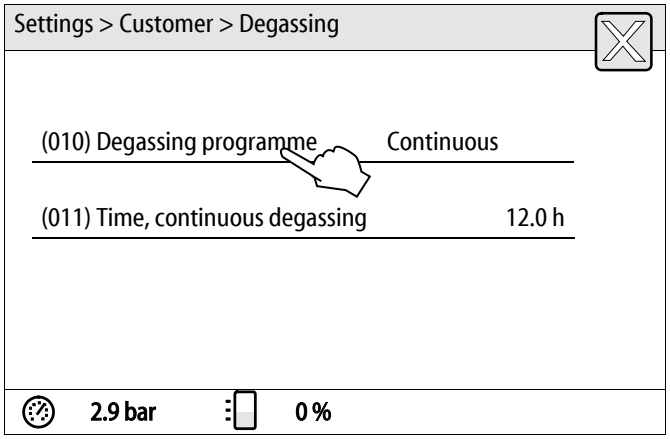
2. Press "Customer >".
   – The controller opens the Customer menu.



3. Press "Degassing >".
   – The controller switches to the selected area.
   – Use the scroll bar to navigate through the list.

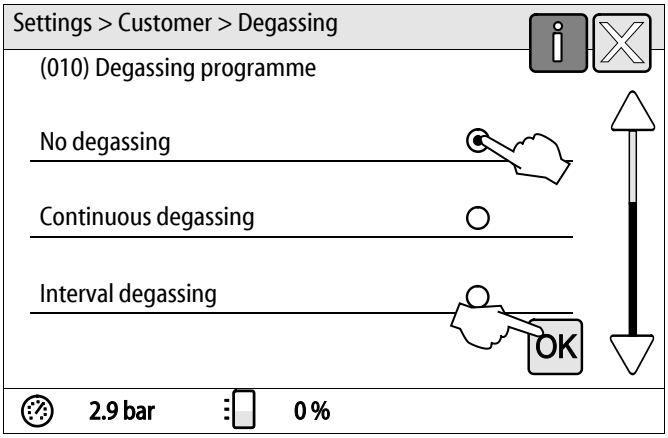


4. Press "(010) Degassing programme".
   – The controller opens the list of degassing programmes.

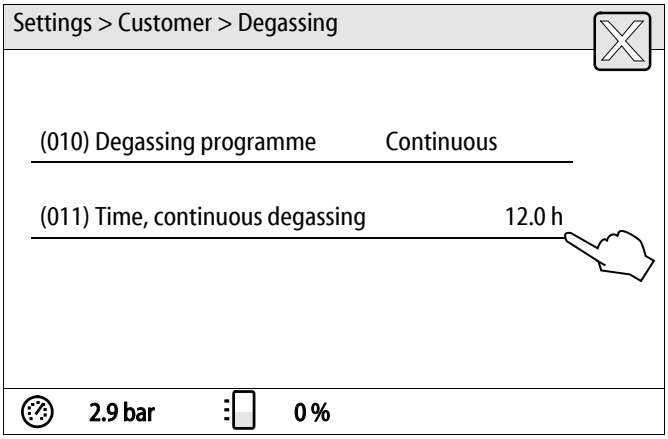


5. To select a menu item, press the "Up" or "Down" scroll bar until this menu item is displayed.
   - Press the desired button.
     - "No degassing" is selected in this example.

       Continuous degassing and interval degassing are deselected.
   - Confirm your selection with "OK".
   - Degassing is deactivated.



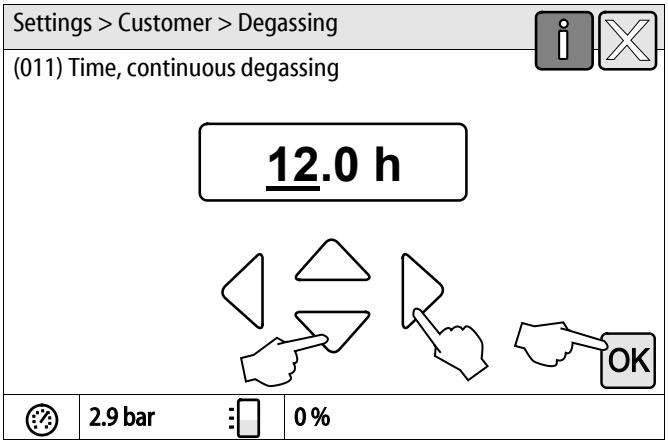
6. Press "(011) Time, continuous degassing“.



7. Set the time for continuous degassing.
   - Use the "Left" and "Right" buttons to select the display value.
   - Use the "Up" and "Down" buttons to change the display value.
   - Confirm your entries with "OK".

   Press "i“ to display a help text for the selected area.

   Press "X“ to cancel your input without saving the new settings. The controller automatically opens again the list.



9.4.5 Degassing programmes – overview

No degassing

This programme is useful when degassing is either impermissible or inadvisable. This is the case when the temperatures of the media to be degassed exceed the permissible Variomat temperature of 70 °C or the Variomat is combined with a Servitec vacuum degassing system.

Continuous degassing

This programme is recommended after commissioning and repairs of the connected system. The device will continuously degas for a set period of time. Air bubbles within the system are quickly removed.

Start/setting:

- Automatic start after execution of the start routine during commissioning.
- Activated from the Customer menu.
- Degassing time: Can be set in the Customer menu, dependent on the actual system: Standard = 12 h, followed by automatic switch to "Interval degassing" mode.

Interval degassing

The interval degassing is stored for continuous operation as default setting in the Customer menu. Degassing is continuous during an interval. An idling time follows an interval. You have the option to limit the interval degassing to a specified time window. You can set the times only in the Service menu.

Start/setting:

- Automatic activation upon expiry of continuous degassing.
- Degassing interval: Standard = 90 s
- Idling time: Standard = 120 min
- Start/End: = 8:00 – 18:00 hours

Run-on degassing

This degassing programme is harmoniously linked to the way the pressure maintenance feature works. It has been designed for specific applications and Summer operation. Please contact our Customer Service for more information.

Activation/setting:

- Activated from the Customer menu.
- Degassing interval: Start for each pump run for a degassing time that you can set in the Service menu (Standard = 4 s)

9.5 Messages

The messages are impermissible deviations from the normal state. They can be output either via the RS-485 interface or via two floating message contacts.

The controller displays the messages with a help text.

Message causes can be eliminated by the operator or a specialist workshop. If this is not possible, contact the Reflex Customer Service.

Notice!

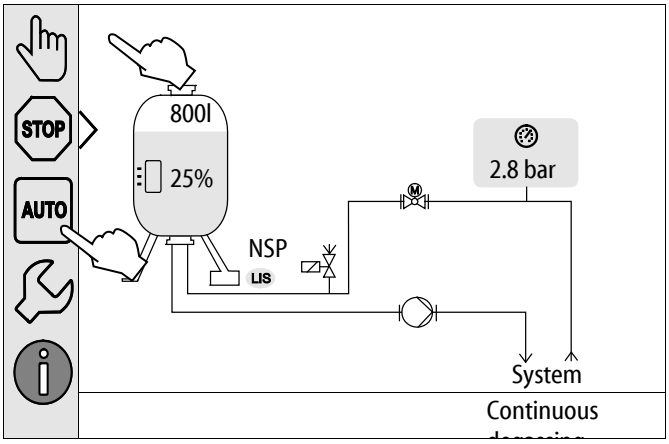
When the cause for the message is eliminated, you must acknowledge the fault with "OK" at the controller's operator panel.

Notice!

Floating contacts, setting in the Customer menu, see chapter 9.4 "Configuring settings in the controller" on page 50 .

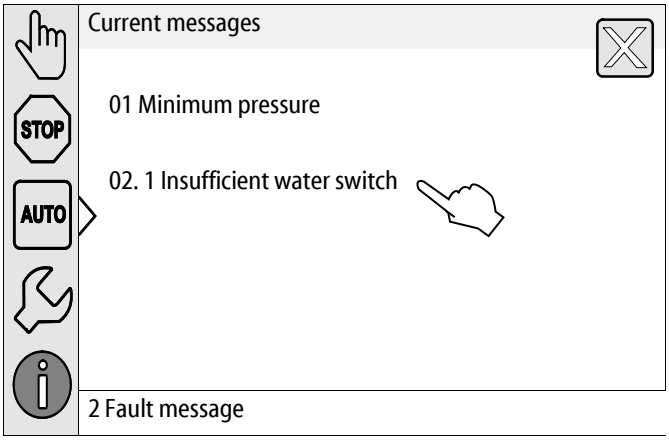
To reset an error message, proceed as follows:

1. Touch the display.



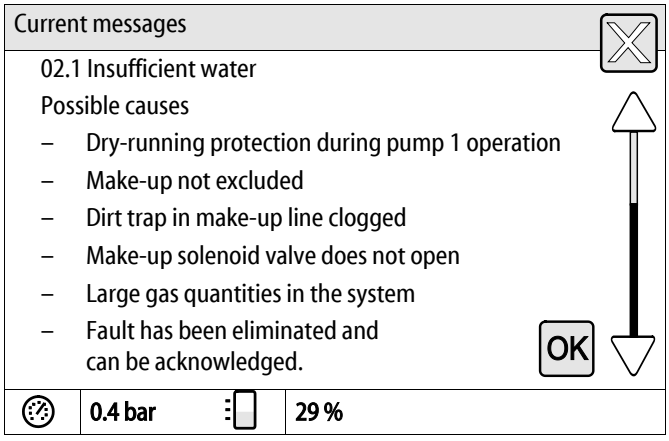
   – The current fault messages are displayed.

2. Touch a fault message.



   – The system displays the possible causes for the fault.

3. When the fault is eliminated, confirm the fault with "OK".


Current messages
02.1 Insufficient water
Possible causes
– Dry-running protection during pump 1 operation
– Make-up not excluded
– Dirt trap in make-up line clogged
– Make-up solenoid valve does not open
– Large gas quantities in the system
– Fault has been eliminated and can be acknowledged.
OK
0.4 bar
29 %

ER Code	Alarm	Floating contact	Causes	Remedy	Alarm reset
01	Min. pressure		• Set value exceeded.	• Water loss in the system? • Fault at "PU" pump • Check pump in manual mode.	"OK"
02.1 02.2	Insufficient water pump 1 Insufficient water pump 2 Only with Variomat 2-2		• Set value exceeded.	• Make-up defective? • Dirt trap clogged; solenoid valve does not open. • Air in the system? • If necessary, manually add water.	–
03	High water		• Set value exceeded.	• Make-up defective? • WV make-up valve does not close? • Inflow from leak in the user's thermal transfer medium? • Tank too small? • Drain water from the tank.	
04.1 04.2	Pump 1 Pump 2 Only with Variomat 2-2		• Pump does not start.	• "PU" pump is stuck. • Motor defective? • 10 A fuse defective? • Contactor (Klixon) tripped.	"OK"
05	Pump run-on time		• Set value exceeded.	• Severe water loss in the system. • Cap valve at the intake side closed? • Air in the "PU" pump? • "PV" overflow valve does not close.	–
06	Make-up time		• Set value exceeded.	• Severe water loss in the system? • Make-up line connected? • Make-up rate insufficient? • Make up hysteresis too high? Change in Service menu, if necessary.	"OK"
07	Make-up cycles		• Set value exceeded.	• Leakage in the system?	"OK"
08	Pressure measurement		• Controller receives incorrect signal.	• "PIS" pressure transducer defective. • Parted cable. • Plug inserted?	"OK"
09	Level sensor		• Controller receives incorrect signal.	• "LIS“ oil pick-up sensor defective. • Parted cable. • Plug inserted?	"OK"
10	Maximum pressure		• Set value exceeded.	• "PV" overflow valve defective, does not open? • "ST“dirt trap clogged?	"OK"
11	Make-up quantity		Only if "With water meter" is activated in the Customer menu. • Set value exceeded.	• Check whether plausible for the monitoring time. • Leakage in the system? • Water quantity per contact incorrectly set in the Service menu.	"OK"

ER Code	Alarm	Floating contact	Causes	Remedy	Alarm reset

15	Make-up valve		• Contact water meter measures without make-up request.	• Check the "WV" make-up valve for leaks.	"OK"
16	Power failure		• No power.	• Check power supply.	–
19	Stop > 4 h		• Device is in Stop mode for more than 4 hours.	• If appropriate, set to Automatic mode.	–
20	Max. Make-up volume		• Set value exceeded.	• Reset the "Make-up quantity" meter in the Customer menu.	"OK"
21	Maintenance recommended		• Set value exceeded.	• Carry out maintenance.	"OK"
24	Softening		• Water capacity setting value or • Time interval for replacement exceeded.	• Replace softening cartridges.	"OK"
30	I/O module fault		• I/O module defective? • Connection between option card and controller faulty. • Option card defective.	• Contact the Reflex Customer Service.	–
31	EEPROM defective		• EEPROM defective? • Internal calculation error?	• Contact the Reflex Customer Service.	"OK"
32	Undervoltage		• Supply voltage exceeded.	• Check power supply.	–
33	Adjustment parameter faulty		• EPROM parameter memory defective.	• Contact the Reflex Customer Service.	–
34	Main board communication faulty		• Connecting cable defective. • Main board defective.	• Contact the Reflex Customer Service.	–
35	Digital input voltage faulty		• Short-circuit of input voltage.	• Check the wiring at the digital inputs (water meter, for example).	–
36	Analogue input voltage faulty		• Short-circuit of input voltage.	• Check the wiring at the analogue inputs (pressure/level).	–
37	Ball valve input voltage missing		• Short-circuit of input voltage.	• Check wiring of the ball valve.	–

Notice!

Messages identified with "OK" must be confirmed with the "OK" button on the display. The device operation is otherwise interrupted. The readiness for operation is maintained for all other messages. They are displayed.

Notice!

If necessary, you can set the output of messages via a floating contact in the Customer menu.

10 Maintenance

Caution – risk of burning!

- Risk of burning from escaping medium
  - Maintain sufficient distance from the escaping medium.
  - Wear suitable personal protective equipment (safety gloves and goggles, for example).

Danger – Electric shock!

- Serious injury or death due to electric shock.
  - Any system in which the device is to be installed must be de-energised.
  - Ensure that the system is locked and cannot be switched on by other personnel.
  - Installation work for the electric connection of the device must be carried out by an authorised electrician in compliance with electrical engineering regulations.

The device is to be maintained annually.

– The maintenance intervals depend on the operating conditions and the degassing times.

The annual maintenance is displayed upon expiry of the set operating time. Use "OK" to acknowledge the "Maintenance recommended" message. Reset the maintenance counter in the Customer menu.

Notice!

Maintenance work must be carried out and confirmed by specialist personnel or the Reflex Customer Service, see chapter 10.4 "Maintenance certificate " on page 68 .

10.1 Maintenance schedule

The maintenance schedule is a summary of maintenance tasks to be carried out regularly.

Maintenance task	Conditions			Interval
▲ = Check, ■ = Service, ● = Clean				
Check for leaks. • "PU" pump. • Screw connections. • Check valve downstream of "PU" pump.	▲	■		Annually
Clean "ST" dirt trap. – see chapter 10.2.1 "Cleaning the dirt trap" on page 64 .	▲	■	●	Depending on the operating conditions
Clear sludge from the primary tank and the secondary tanks. – see chapter 10.2.2 "Cleaning the tanks" on page 65 .	▲	■	●	Depending on the operating conditions
Check the make-up switching points. – see chapter 10.3 "Checking switching points" on page 66 .	▲			Annually
Check the Automatic mode switching points. – see chapter 10.3 "Checking switching points" on page 66 .	▲			Annually

10.2 Cleaning

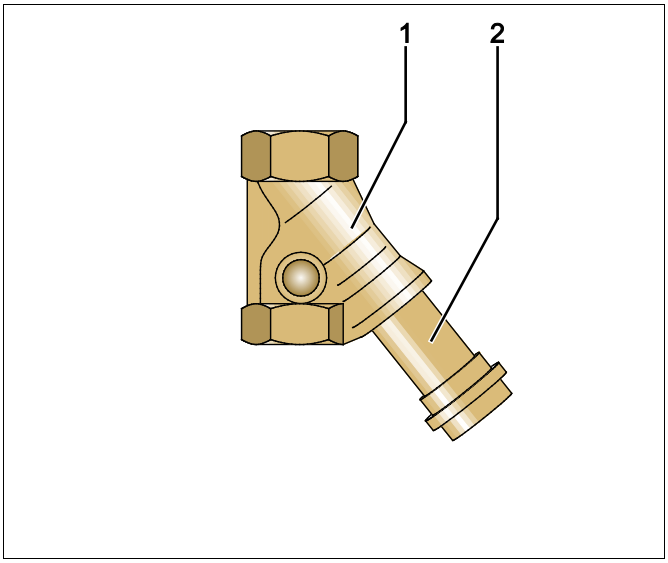
10.2.1 Cleaning the dirt trap

Caution – risk of injury!

- Incorrect installation or service work may cause burns and other injuries at the connections when hot water or steam suddenly escape at pressure.
  - Ensure proper installation.
  - Ensure that the system is de-pressurised before performing service work at the connections.

The "ST" dirt trap must be cleaned after the expiry of the continuous degassing time at the latest. An inspection is also required after longer lasting operation.

- Switch to Stop mode.
- Close the ball vales upstream of the "ST" dirt trap (1) and the primary tank.
- Slowly unscrew the dirt trap insert (2) from the dirt trap in order for the residual pressure to escape from the pipeline segment.
- Pull the mesh from the dirt trap insert and rinse it with clear water. Use a soft brush for cleaning.
- Re-insert the mesh into the dirt trap insert, check the gasket for damage, and screw the dirt trap insert back into the housing of the "ST" (1) dirt trap.
- Open the ball vales upstream of the "ST" dirt trap (1) and the primary tank.
- Vent the "PU“ pump, see chapter 7.5 "Venting the pump" on page 40 .
- Switch to Automatic mode.



1	"ST" dirt trap	2	Dirt trap insert

Notice!

Clean all other installed dirt traps (in the Fillset, for example).

10.2.2 Cleaning the tanks

Caution – risk of injury!

- Incorrect installation or service work may cause burns and other injuries at the connections when hot water or steam suddenly escape at pressure.
  - Ensure proper installation.
  - Ensure that the system is de-pressurised before performing service work at the connections.

Clean the primary tank and the secondary tanks from sludge deposits.

1. Switch to Stop mode.
2. Empty the tanks.
   - Open the "FD" feed and drain cocks and empty the tanks completely from water.
3. Remove the hose connection between the primary tank and the and the secondary tank, if provided.
4. Remove the lower vessel covers from the tanks.
5. Remove any sludge from the covers and the spaces between the diaphragms and the tanks.
6. Reinstall the covers on the tanks.
7. Reinstall the hose connection between the primary tank and the and the secondary tank, if provided.
8. Close the "FD" feed and drain cocks at the tanks.
9. Use the "FD" feed and drain cock to fill the primary tank with water, see chapter 7.4 "Filling the tanks with water" on page 39 .
10. Switch to Automatic mode.

10.3 Checking switching points

Prerequisite for checking the switching points are the following correct settings:

- Minimum operating pressure P_0, see chapter 7.2 "Determining the P_0 minimum operating pressure for the controller" on page 38 .
- Level sensor at the primary tank.

Preparation

1. Switch to Automatic mode.
2. Close the cap valves upstream of the tanks.
3. Record the displayed filling level (value in %).
4. Drain the water from the tanks.

Checking the cut-in pressure

5. Check the cut-in and cut-out pressure of the "PU" pump.
   - The pump cuts in at P_0 + 0.3 bar.
   - The pump cuts out at P_0 + 0.5 bar.

Checking the Make-up "On"

6. If necessary, check the make-up value displayed at the controller.
   - The automatic make-up is activated at a level display of 20 %.

Checking Insufficient water "On"

7. Switch off the make-up and continue to drain water from the tanks.
8. Check the displayed value for the "Insufficient water" filling level message.
   - Insufficient water "On" is displayed at the controller at a minimum filling level of 5 %.
9. Switch to Stop mode.
10. Switch off the main switch.

Cleaning the tanks

If necessary, remove condensate from the tanks, see chapter 10.2.2 "Cleaning the tanks" on page 65 .

Activating the device

11. Switch on the main switch.
12. Activate the make-up.
13. Switch to Automatic mode.
    – Depending on the filling level and pressure, the "PU" pump and the automatic make-up will be switched on.
14. Slowly open the cap valves upstream of the tanks and secure them against unintended closing.

Checking Insufficient water "Off"

15. Check the displayed value for the Insufficient water "OFF" filling level message.
    – Insufficient water "Off" is displayed at the controller at a minimum filling level of 7 %.

Checking Make-up "Off"

16. If necessary, check the make-up value displayed at the controller.
    – The automatic make-up is deactivated at a level display of 25 %.

Maintenance is completed.

Notice!

If automatic make-up is not connected, you must manually fill the tanks with water to the recorded filling level.

Notice!

The setting values for pressure maintenance, filling levels and make-up are provided in the chapter Standard settings, see chapter 9.4.3 "Default settings" on page 54 .

10.4 Maintenance certificate

All maintenance tasks have been completed according to the Reflex Installation, Operating and Maintenance Manual.

Date	Service organisation	Signature	Remarks

10.5 Inspection

10.5.1 Pressure-bearing components

Comply with all applicable national regulations for the operation of pressure equipment. De-pressurise all pressurised components prior to inspection (see disassembly information).

10.5.2 Inspection prior to commissioning

In Germany, follow the Industrial Safety Regulation [Betriebssicherheitsverordnung] Section 14 and Section 14 (3) No. 6 in particular.

10.5.3 Inspection intervals

Recommended maximum inspection intervals for operation in Germany pursuant to Section 15 of the Industrial Safety Regulation [Betriebssicherheitsverordnung] and the vessel classification of the device in diagram 2 of the EU Directive 97/23/EC, applicable in strict compliance with the Reflex Installation, Operation and Maintenance Manual.

External inspection:

No requirement according to Section 15 (6).

Internal inspection:

Maximum interval according to Section § 15 (5); if necessary, suitable replacement actions are to be taken (such as wall thickness measurement and comparison with the design specification which may be requested from the manufacturer)..

Tightness test:

Maximum interval according to Section 15 (5), possibly in conjunction with Section 15 (10).

Furthermore, compliance with Section 15 of the Industrial Safety Regulation and Section 15 (1) in particular, in conjunction with Section 14 (3) No. 6 and Section 15 (6), must be ensured.

The actual intervals must be determined by the user on the basis of a safety-technical assessment taking into account the real operational conditions, the experience with the operation and the charging material, and the national regulations for the operation of pressure equipment.

11 Disassembly

Danger – Electric shock!

- Serious injury or death due to electric shock.
  - Any system in which the device is to be installed must be de-energised.
  - Ensure that the system is locked and cannot be switched on by other personnel.
  - Installation work for the electric connection of the device must be carried out by an authorised electrician in compliance with electrical engineering regulations.

Danger – Electric shock!

- Serious injury or death due to electric shock. Some parts of the main board may still carry 230V voltage even with the device physically isolated from the 230 V power supply.
  - Before you remove the covers, completely isolate the device controller from the power supply.

Caution – risk of burning!

- Risk of burning from escaping medium
  - Maintain sufficient distance from the escaping medium.
  - Wear suitable personal protective equipment (safety gloves and goggles, for example).

Caution – risk of burning!

- Excessive surface temperatures in heating systems can cause skin to burn.
  - Wait until surfaces have cooled down or wear protective gloves.
  - The operator is required to attach corresponding warning notes in the device vicinity.

Caution – risk of injury!

- Incorrect installation or service work may cause burns and other injuries at the connections when hot water or steam suddenly escape at pressure.
  - Ensure proper disassembly.
  - Ensure that the system is de-pressurised before performing the disassembly.

- Prior to disassembly, disconnect all water-sided connections from the device.
- Vent the device to de-pressurise it.

1. Disconnect the system from the power supply and secure it against unintended reactivation.
2. Disconnect the power cable of the device from the power supply.
3. Disconnect and remove all cables from the terminals of the device controller.
4. Disconnect the secondary tank (if provided) on the water side from the system and the primary tank.
5. Open the "FD" feed and drain cocks at the tanks until they are completely empty and de-pressurised..
6. Undo all hose and pipe connections to the tanks and the control unit of the device to the system and remove them completely.
7. If necessary, remove the tanks and the control unit from the system area.

12 Annex

12.1 Reflex Customer Service

Central customer service

Switchboard: Telephone number: +49 (0)2382 7069 - 0
Customer Service extension: +49 (0)2382 7069 - 9505
Fax: +49 (0)2382 7069 - 523
E-mail: service@reflex.de

12.2 Conformity and standards

Declaration of conformity for electrical installations in the pressure maintaining, make-up or degassing systems		
1.	We hereby confirm that the products meet the essential protection requirements as established in the Council Directive to approximate the laws of the Member States relating to electromagnetic compatibility (2004/108/EC). The following Standards have been applied to assess the products:	Deutsches Institut für Normung, European Standard 61326 – 1:2006-10
2.	We hereby confirm that the control cabinets meet the essential requirements of the Low-voltage Directive (2006/95/EC). The following Standards have been applied to assess the products:	Deutsches Institut für Normung, European Standard 61010 – 1:2002-08, Occupational Health and Safety Regulations of the trade associations (German BGV, Para 2)

Declaration of conformity for assemblies	Design, manufacture, and testing of pressure equipment
Applied assessment of conformity procedure according to the Pressure Equipment Directive 97/23/EU of the European Parliament and the Council of 29 May 1997	
Pressure expansion tanks and pressure-maintaining systems:	**Device for universal application in heating, solar and cooling water systems**
Type	according to vessel/assembly nameplate
Serial number	according to vessel/assembly nameplate
Year of manufacturing	according to vessel/assembly nameplate
Maximum allowable pressure	according to vessel/assembly nameplate
Test pressure	according to vessel nameplate
Minimum/maximum permissible temperature	according to vessel/assembly nameplate
Maximum continuous operation temperature for full and semi diaphragm	according to vessel/assembly nameplate
Charging material	Water, inert gas or air according to vessel nameplate
Standards and set of rules	Pressure Equipment Directive, prEN 13831:2000 or European Standard 13831:2007 or AD 2000 according to vessel nameplate
Pressure equipment	Vessel, Article 3 Para. 1.1 a) 2. - (Annex II, Diagram 2) with: – Accessories, Article 3 Para. 1.4: Full diaphragm, vent pipe, equalising elbow and drain cock with flexible connection set Assembly Article 3 Para. 2.2 comprising: – Vessel, Article 3 Para. 1.1 a) 2. - (Annex II, Diagram 2) with: Accessories, Article 3 Para. 1.4: Full diaphragm, vent pipe, equalising elbow and drain cock with flexible connection set – Accessories, Article 3 Para. 1.4: Control unit with safety valve

Fluid group	2
Conformity assessment to module	B + D
Labelling according to Directive 97/23/EC	CE 0045
Safety valve (air side) (Category IV) See operating manual, item SV	Labelled and certified by the safety valve manufacturer pursuant to the provisions of the Directive 97/23/EC.
Certificate number of the EC Type Examination	For a vessel size of 200 to 1000 litres: 04 202 1 932 01 00051 For a vessel size of 1000 to 5000 litres: 04 202 1 450 02 00712
Certificate No., QA system (Module D)	07 202 1403 Z 0250/12/D0045
Notified body for the assessment of the QA system	TÜV Nord Systems GmbH & Co. KG Große Bahnstraße 31, D - 22525 Hamburg
Register No. of the notified body	0045
Manufacturer **Reflex Winkelmann GmbH** Gersteinstraße 19 D - 59227 Ahlen - Germany Telephone: +49 (0)2382 7069-0 Fax: +49 (0)2382 7069-588 E-mail: info@reflex.de	The manufacturer declares that the pressure equipment (the assembly) complies with the requirements of Directive 97/23/EC. Norbert Hülsmann / Volker Mauel Members of the Board of Directors

12.3 Certificate No. of the design type examination

Type			Certificate number
Reflexomat Compact RC	200 – 500 litres	6 bar – 120 °C	04 202 1 450 04 01952
Reflexomat RS	200 – 800 litres	6 bar – 120 °C	04 202 1 932 01 00077
	1000 – 5000 litres	6 bar – 120 °C	04 202 1 450 02 00714
	350 – 5000 litres	10 bar – 120 °C	04 202 1 450 02 00039
	1000 – 5000 litres	10 bar – 120 °C	04 202 1 450 02 00715
Variomat	200 – 1000 litres	10 bar – 120 °C	04 202 1 932 01 00051
	1000 – 5000 litres	10 bar – 120 °C	04 202 1 450 02 00712
Gigamat	1000 – 5000 litres	10 bar – 120 °C	04 202 1 450 02 00713
	10000 Litres	10 bar – 120 °C	04 202 1 450 02 00062
Servitec	DN 150 - DN 250	10 bar/16 bar – 120 °C	04 202 1 450 03 00210

12.4 Guarantee

The respective statutory guarantee regulations apply.

12.5 Glossary

System	Heating, climate control or other building services system to which the device is connected.
Hysteresis	Delayed behaviour of an output variable relative to the input variable. (The input signal influences the output signal)
Cavitation	Formation and dissolution of vapour-filled cavities (vapour bubbles) in fluids.
Cumulated	Cumulation of values.
Klixon	Pressure safety cut-out for the protection of the pump motor.
Permeation	Process in which a substance (permeate) penetrates or migrates through a solid body.

SI1427en / 9125160 / 06-14

Thinking solutions.

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